

**PACKAGING- AND TRANSPORTATION-RELATED
OCCURRENCE REPORTS**

FY 1994 ANNUAL REPORT

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ACRONYMS

ALO	Albuquerque Operations
ANLE	Argonne National Laboratory - East
BNL	Brookhaven National Laboratory
BPOI	Bechtel Petroleum Operations, Inc.
CFR	Code of Federal Regulations
CH	Chicago Operations
CY	Calendar year
DoD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DP	Defense Programs
EE	Energy Efficiency and Renewable Energy
EG&G	EG&G Idaho, Inc.
EGGM	EG&G Mound Applied Technologies, Inc.
EGGR	EG&G Rocky Flats, Inc.
EH or ES&H	Office of Environment, Safety and Health
EM	Environmental Restoration and Waste Management
ER	Energy Research
FAA	Federal Aviation Administration
FE	Fossil Energy
FEMP	Fernald Environmental Management Project
FMCSR	Federal Motor Carrier Safety Regulation
FY	Fiscal year
GE/KN	General Electric KNOLLS Atomic Power Laboratory
HQ	DOE Headquarters
ID	Idaho Operations
INEL	Idaho National Engineering Laboratory
KCP	Kansas City Plant
KEH	Kaiser Engineers Hanford
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LLW	Low-level Waste
MHSM	Mason & Hanger, Silas-Mason co., Inc.
MKFO	MK-Ferguson
MMES	Martin Marietta Energy Systems, Inc.
NE	Nuclear Energy
NOC	Nature of Occurrence
NRC	Nuclear Regulatory Commission
NVO	Nevada Operations
OAK	Oakland Operations

OR	Occurrence Report
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
ORPS	Occurrence Reporting and Processing System
PANX	Pantex Plant
PATS	Packaging and Transportation Safety
PCB	Polychlorinated Biphenyl
PGDP	Paducah Gaseous Diffusion Plant
PNL	Pacific Northwest Laboratory
PORTS	Portsmouth Gaseous Diffusion Plant
PPPL	Princeton Plasma Physics Laboratory
REECO	Reynolds Electrical & Engineering Company
RL	Richland Operations
RW	Radioactive Waste Management
SARP	Safety Analysis Report for Packaging
SDAR	Storage/Disposal Approval Record
SEG	Scientific Ecology Group
SMAC	Shipment/Mobility Accountability Collection
SNL/A	Sandia National Laboratory–Albuquerque
SNL/L	Sandia National Laboratory–Livermore
SR	Savannah River Operations
T&P	Transportation and Packaging
TDEC	Tennessee Department of Environment and Conservation
UMTRA	Uranium Mill Tailings Remedial Actions Project
USACE	United States Army Corp of Engineers
USEC	United States Enrichment Corporation
WHC	Westinghouse Hanford Company
WIPP	Waste Isolation Pilot Plant
WSRC	Westinghouse Savannah River Company
WVNS	West Valley Nuclear Services, Inc.
X-10	Oak Ridge X-10 Plant
Y-12	Oak Ridge Y-12 Plant

EXECUTIVE SUMMARY

The Oak Ridge National Laboratory, through its support to the Department of Energy's Office of Facility Safety Analysis, EH-32, retrieves reports and information pertaining to transportation and packaging occurrences from the centralized Occurrence Reporting and Processing System data base. These selected reports are analyzed for trends, impact on packaging and transportation operations and safety concerns, and "lessons learned" in transportation and packaging safety. The selected reports are reviewed to determine if appropriate corrective actions are being conducted.

This report contains an analysis of 186 occurrences selected during FY 1994, with supporting data from 1991 to 1994 which provides the basis for trending. Through this study, it was determined that almost one-half of the offsite occurrences not caused by non-DOE shippers were related to shipping preparation. Modal safety is the second most common offsite nature of occurrence. Onsite occurrences were most frequently contamination resulting from a transportation-related incident. Examining these major nature of occurrences against the reported root causes, it was found that:

- for shipment preparation, packaging, or contamination occurrences, the most frequent root cause is management problems; and
- for modal safety and occurrences caused by others, the most frequent cause is personnel error.

The trends from the historical data indicate consistency in the nature of occurrence, the root cause, and their relationship. Review of corrective actions indicates that the resolution of the occurrences is proceeding satisfactorily; more follow up with site contact is suggested to determine if recurrence is actually prevented. The lessons learned bulletins produced by this project have been received enthusiastically by the operators in the field.

1. INTRODUCTION

The U. S. Department of Energy (DOE) Occurrence Reporting and Processing System (ORPS) is an interactive computer system designed to support DOE-owned or operated facilities in reporting and processing information concerning occurrences related to facility operations. The requirements for reporting and the extent of the occurrences to be reported are defined in DOE Order 5000.3B, "Occurrence Reporting and Processing of Operations Information." The centralized database, managed through the Idaho National Engineering Laboratory (INEL), provides computerized support for the collection, distribution, updating, analysis, and sign-off of information in the occurrence reports.

The Oak Ridge National Laboratory (ORNL) Packaging and Transportation Safety Program (PATS) has been charged with the responsibility of retrieving reports and information pertaining to transportation and packaging incidents from the centralized ORPS database. These selected reports are analyzed for trends, impact on packaging and transportation operations and safety concerns, and "lessons learned" in transportation and packaging safety. Moreover, the selected occurrence reports (ORs) are reviewed to see if the DOE Order 5000.3B requirement to provide for appropriate corrective actions is being conducted. This task is designed not only to keep the DOE Office of Facility Safety Analysis, EH-32, aware of what is occurring on DOE sites and potential transportation and packaging problems that may need attention, but also it is intended to allow dissemination of "lessons learned" to the Operations Offices, with the subsequent flow of information to contractors.

This annual report details (1) the methodology that PATS uses to conduct searches of the ORPS for pertinent information, (2) the form of reporting to EH-32, (3) major shippers of hazardous materials and major reporters of occurrences, (4) review and examination of trends observed in ORs analyzed by the nature of occurrence (NOC) codes of PATS, (5) a presentation and discussion of the root-cause codes of ORPS, (6) analysis of all ORs that were categorized on the ORPS as emergency or unusual, and (7) analysis of all ORs that were classified by PATS to have a NOC of either 2 (pertaining to packaging) or 5 (pertaining to shipment preparation) to determine whether the actions taken to close out the occurrences were sufficient to assure remediation of the incident and prevent recurrence.

Though this report will present an analysis of the ORs that happened during fiscal year (FY) 1994, as reported to DOE-Headquarters (HQ) in the *Weekly Reports*, it will also use historical ORs to analyze for trends and patterns. Because the previous Annual Report was based on the calendar year (CY), there will be overlap with this report due to the common time period (October 1 through December 31). Based on *Weekly Reports* OR-93-40 (starting October 3, 1993) through OR-94-39 (ending October 1, 1994), 186 ORs were selected of the 6,626 total occurrences reported in 1994 to the ORPS. One hundred and twenty-five of the 186 packaging and transportation-related ORs have been finalized. Up to October 1, 1993, 497 ORs had been previously selected, some of which were not reported in the weekly reports and, hence, are designated as historical. Therefore, including the ORs reported last year, 683 ORs (of which 599

are finals) will be reviewed for this report, with emphasis on the occurrences of FY 1994. Figure 1 shows the number of packaging or transportation-related ORs that have been selected from the ORPS, by fiscal year since the ORPS was created.

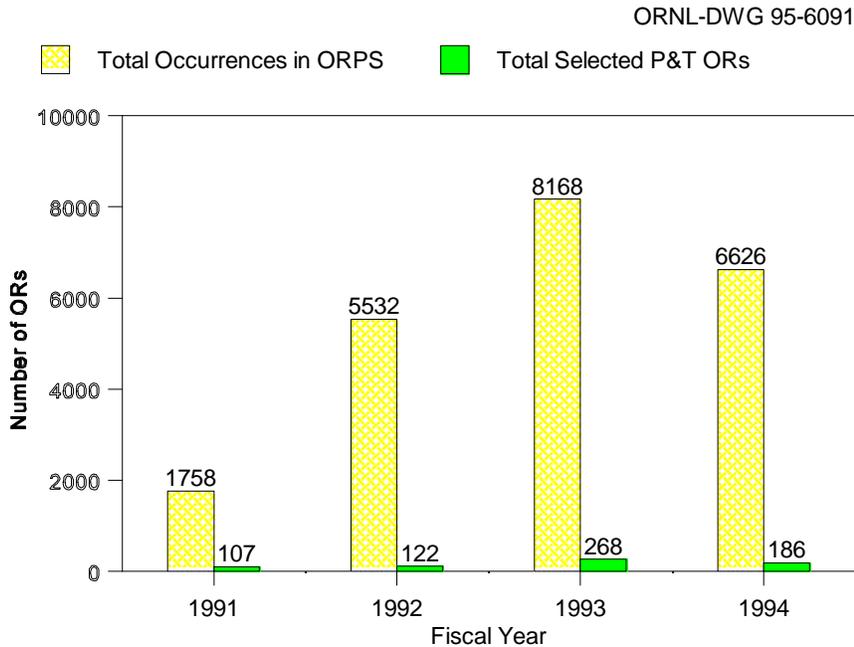


Fig. 1. P&T-related ORs selected by FY.

1.1 METHODOLOGY AND REPORTING

ORNL PATS staff conducted daily searches of ORPS to scan and retrieve summaries of ten-day reports (and updates to the ten-day reports), reviewing each to identify those that have packaging and transportation significance. Final reports are also scanned to update previously selected occurrences.

Once the ORPS system has been scanned and the applicable ORs have been selected by a searcher, the selected ORs are then independently checked by another transportation specialist to verify the selection. The selected ORs are compiled into a table that lists (1) report date, (2) discovery date of the occurrence, (3) OR number, (4) occurrence type, (5) the nature of the packaging and transportation safety concern, (6) damage and injury resulting from the occurrence, and (7) follow-up action taken. This tabular listing of the selected ORs is compiled weekly and transmitted electronically to key personnel of EH-32 for review and distribution at DOE-HQ as well as for further direction to PATS for follow-up. Also, a quarterly summary of the submitted

weeklies is compiled, detailed for any unusual or emergency occurrences, analyzed for trends, and submitted to EH-32 for distribution. This annual report represents the second annual report of this program.

1.2 CATEGORIZATION OF OCCURRENCES

DOE Order 5000.3B categorizes ORs into three types: emergency, unusual, and off-normal. For packaging and transportation concerns, DOE Order 5000.3B defines these categories (under Group 6 of Appendix 1) as:

1. *Emergency.* An offsite transportation event involving the release of a reportable quantity of hazardous substance (per 49 CFR Part 171.8) which is transported in support of departmental operations.
2. *Unusual.* An offsite transportation event involving the release of hazardous material in a quantity greater than limited quantities (or any release of radioactive material) or any shipment of radioactive material or hazardous waste that arrives at its destination (1) with a nonreconcilable shipping paper discrepancy or unaccounted-for package related to material quantity or (2) with radiation or contamination levels in excess of U.S. Department of Transportation (DOT) allowable limits. Violations of Federal Motor Carrier Safety Regulations (FMCSRs) or Federal Aviation Administration (FAA) regulations involving a release of hazardous material are also included. Onsite "unusual occurrences" are defined similarly for releases.
3. *Off-normal.* An offsite event involving a release of hazardous material other than radioactive that does not exceed a limited quantity. Violations of marking, labeling, placarding, routing, or separating/segregating materials are included in the criteria as is any transportation event involving departmental property resulting in vehicular or aircraft damage of more than \$5,000 (or total losses). Included in this definition are also violations of DOT Federal Motor Carrier Safety or FAA regulations, evidence of improper classification of hazardous materials, improper selection or assembly of a hazardous material package, cargo that has shifted during transport, or transportation activities performed by unqualified personnel. Onsite "off-normal" events are defined similarly.

Of the occurrences reported during FY 1994, only one occurrence was listed as "emergency," and 11 were listed as "unusual." The emergency-categorized OR has been finalized, but only three of the unusual ORs have been finalized.

2. MAJOR SHIPPERS AND REPORTERS OF OCCURRENCES

The Shipment Mobility/Accountability Collection (SMAC) is DOE's unclassified, computer-based historical transportation information system. SMAC provides centralized collection, analysis, and reporting of transportation data for shipments made by and on behalf of DOE. SMAC is operated for DOE by Science Applications International Corporation. The SMAC system is funded by Environmental Restoration and Waste Management, Transportation Management Division, through the DOE Oak Ridge Operations Office. The SMAC system contains data concerning shipments made on behalf of DOE, with the exception of parcel post and certain United Parcel Service shipments. At present, SMAC contains information on more than two million DOE shipments.

SMAC provides summaries for this project on hazardous materials shipments made by the DOE contractors during a specified time frame. SMAC data reveal that, similar to last year, in FY 1994, Lawrence Livermore National Laboratory (LLNL) was the most active shipper with 3,722 of the total 20,520 hazardous material shipments reported for the year. Second was Fernald Environmental Management Project (FEMP) with 1,556 shipments. In the last CY, Paducah Gaseous Diffusion Plant (PGDP) reported the second greatest number of shipments with 1,944. However this FY it reported only 28 shipments, and the Portsmouth Gaseous Diffusion Plant (PORTS) reported 49. This great change in reported number of shipments has occurred simply because these sites' enriched material shipments are conducted by Martin Marietta Utility Services, which manages the facility for the United States Enrichment Corporation (USEC), which is not required to report to SMAC. Figure 2 presents those contractors who reported more than 800 shipments to SMAC during FY 1994.

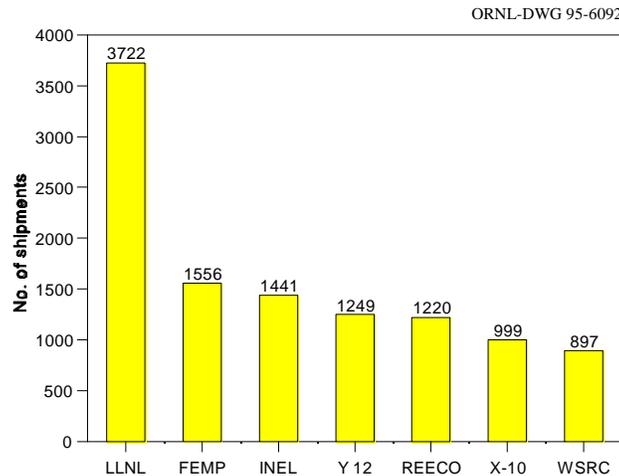


Fig. 2. Contractors conducting over 800 shipments during 1994 (SMAC data).

Figure 3 presents those contractors who reported more than 300 but fewer than 800 shipments to SMAC during FY 1994. (The acronym list in the front matter of this report contains the full names of the contractors indicated in these figures.) Table 1 lists the number of packaging- and transportation-related ORs of shippers who reported more than 300 hazardous materials' shipments during FY 1994 to SMAC. The shippers are listed in alphabetical order for ease of reference. Occurrences are categorized in Figs. 4 and 5 into onsite, offsite, and others. Any occurrence that happens in an area which is within the boundaries of a DOE site or facility that is fenced or otherwise access-controlled is defined as an onsite occurrence. Offsite occurrences are those occurrences that happen in any area within or outside a DOE site to which the public has free and unlimited access. The category "others" is used by PATS to designate occurrences that were created by organizations other than the reporting group. This category ensures that occurrences are not charged against a contractor simply because they properly discovered and reported it. Because onsite shipments are not reported to SMAC, comparisons should be related to offsite occurrences only, not the total occurrences reported by the site.

The charts of Figs. 4 and 5 present the shippers that reported over 800 ORs to SMAC during FY 1994. Reference to these figures show that occurrences created by others increased during FY 1994. This can also be verified by reviewing Table 1. However the increases are so slight that no really significant statement can be made of this fact, especially since the increases were not seen at every reporting site. There was also a slight increase in the total reporting of occurrences by the contractors, which is probably a factor of more rigorous reporting practices than an actual increase in incidents.

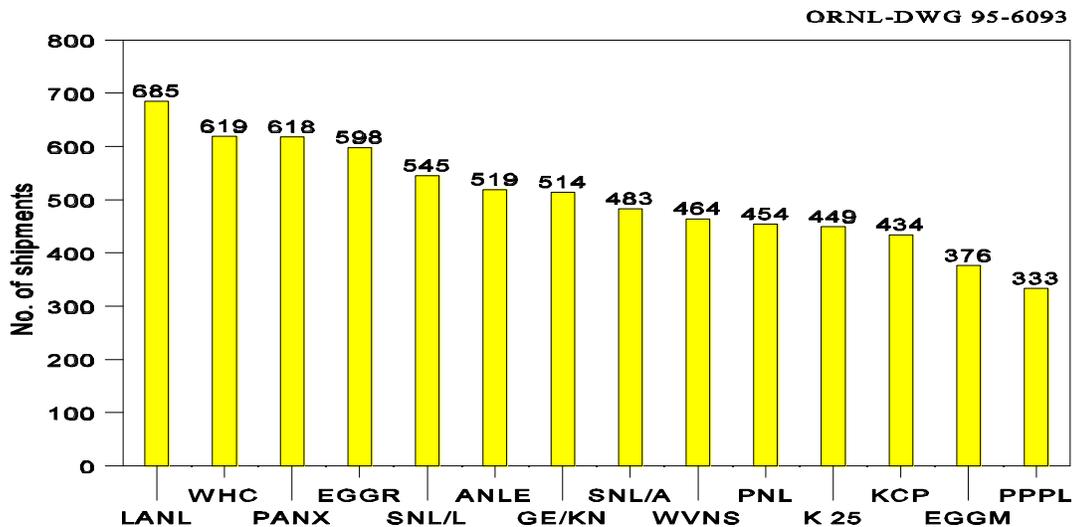


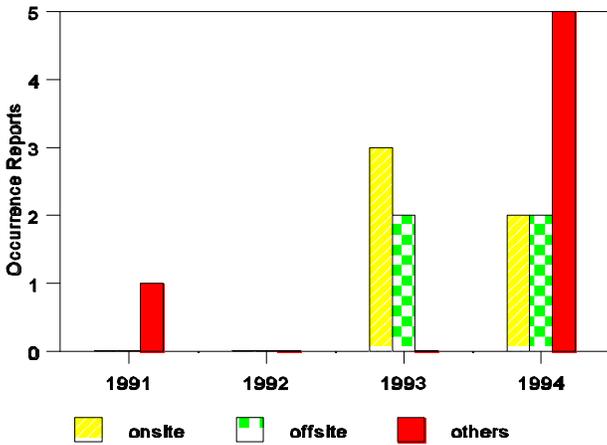
Fig. 3. Contractors with between 300 and 800 shipments during 1994 (SMAC data).

Table 1. ORs per year for contractors with >300 shipments during FY 1994

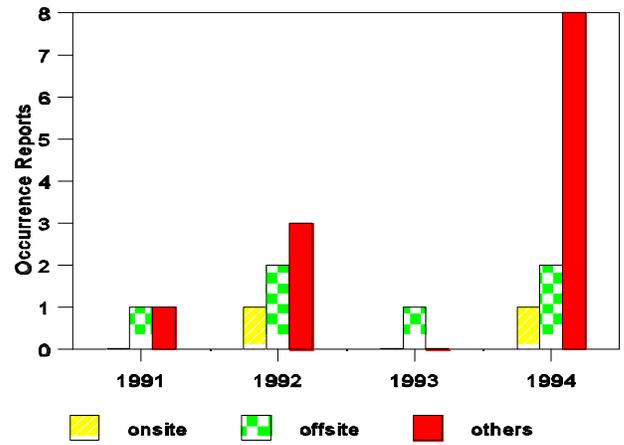
Contractor	Year	Onsite	Offsite	Others	Contractor	Year	Onsite	Offsite	Others
ANLE	1991	1	0	1	EGGM	1991	0	0	2
	1992	1	0	0		1992	1	0	0
	1993	2	1	0		1993	1	0	1
	1994	1	3	1		1994	0	0	1
EGGR	1991	0	0	2	FEMP	1991	0	1	1
	1992	2	1	0		1992	1	2	3
	1993	5	2	0		1993	0	1	0
	1994	5	1	3		1994	1	2	8
GE/KN	1991	0	0	0	INEL	1991	0	1	2
	1992	0	0	0		1992	0	0	1
	1993	0	0	0		1993	2	0	0
	1994	0	0	0		1994	1	1	0
KCP	1991	0	0	0	K-25	1991	2	0	0
	1992	0	0	0		1992	5	1	3
	1993	0	1	0		1993	0	0	0
	1994	0	0	0		1994	2	1	0
LANL	1991	2	0	0	LLNL	1991	0	0	1
	1992	1	0	5		1992	0	0	0
	1993	14	6	14		1993	3	2	0
	1994	9	7	5		1994	2	2	5

Table 1. (continued)

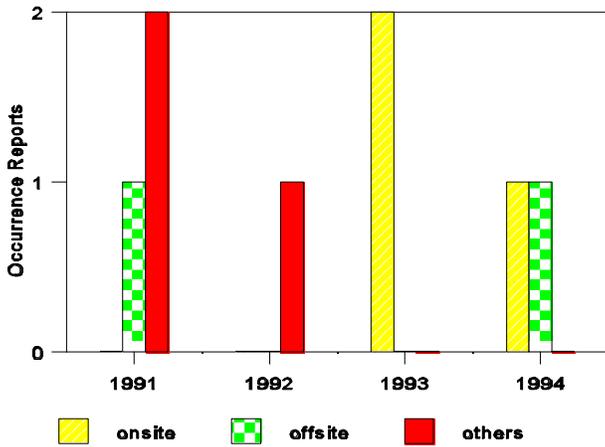
Contractor	Year	Onsite	Offsite	Others	Contractor	Year	Onsite	Offsite	Others
PANTEX	1991	0	0	2	PNL	1991	2	4	0
	1992	3	3	0		1992	1	1	0
	1993	2	4	0		1993	2	0	0
	1994	2	3	1		1994	0	1	2
PPPL	1991	0	0	0	REECO	1991	0	3	0
	1992	0	0	0		1992	0	0	1
	1993	0	1	0		1993	4	1	0
	1994	0	0	0		1994	0	3	0
SNL/A	1991	0	0	0	SNL/L	1991	0	0	1
	1992	0	1	0		1992	0	0	0
	1993	1	0	1		1993	0	1	0
	1994	3	2	0		1994	0	0	0
WHC	1991	6	4	2	WSRC	1991	5	0	1
	1992	10	7	6		1992	5	5	0
	1993	25	3	3		1993	17	2	1
	1994	19	1	6		1994	8	3	4
WVNS	1991	1	0	0	X-10	1991	2	4	1
	1992	0	1	0		1992	1	2	0
	1993	0	1	7		1993	3	1	1
	1994	0	0	2		1994	2	3	2
Y-12	1991	5	0	0					
	1992	0	2	2					
	1993	2	3	2					
	1994	8	1	2					



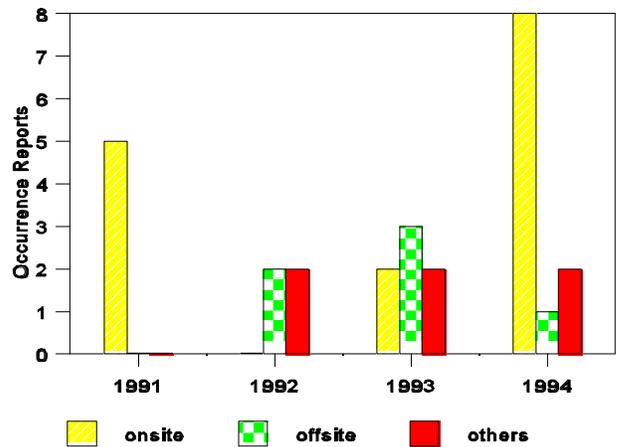
LLNL



FEMP

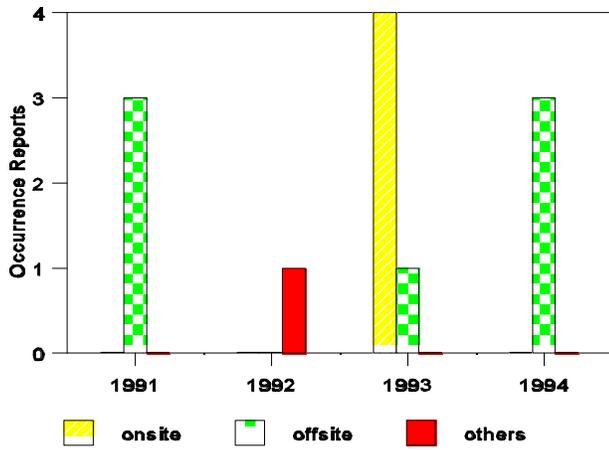


INEL

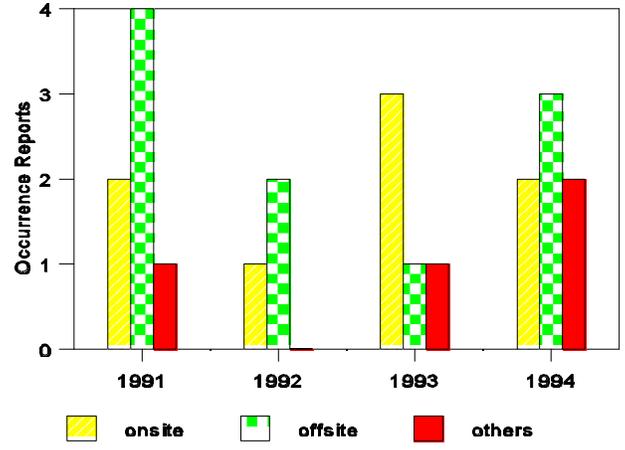


Y-12

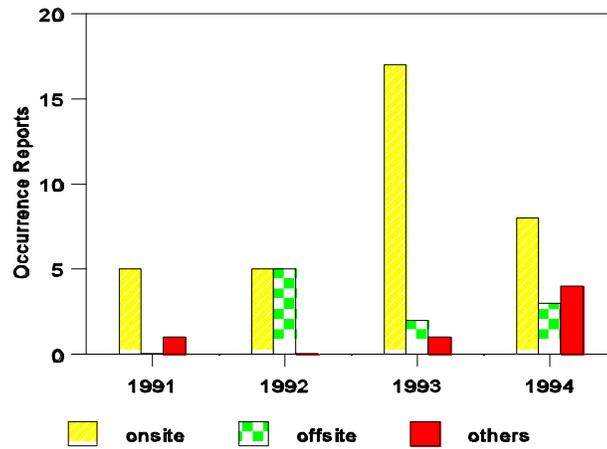
Fig. 4. ORs of shippers with greater than 800 shipments (LLNL, FEMP, INEL, Y-12).



REECO



X-10



WSRC

Fig. 5. ORs of shippers with greater than 800 shipments (REECO, X-10, WSRC).

3. THE NATURE OF OCCURRENCE OF THE INCIDENT

The PATS-assigned NOC basically seeks to determine what occurred and to classify it according to specific packaging- and transportation-related safety issues rather than using the more general ORPS "NOC" assigned to the incident (see *ORPS User's Manual*, DOE/ID-10319). NOC coding categorizes ORs by unique packaging- and transportation-related criteria to focus on patterns and useful information for Headquarter's use and "lessons-learned." (For a complete discussion of the selection criteria, please reference the *PATS ORPS MANUAL*.) Table 2 presents a listing of the PATS-assigned NOC codes used to provide a preliminary identification of each OR's relationship to packaging and transportation issues.

Table 2, the NOC classification system, has been modified since last year's annual report. The classification system was intended to provide an initial determination of "what" happened that made the occurrence of interest to the packaging and transportation community. The experience gained over the reporting history of about 1.5 years led the PATS staff to consider that the prior categories 4, "Quality Assurance", and 7, "Operations," related more to the "why" of an occurrence rather than to a "what." The staff also determined that they were missing an important category, "Improper Waste Characterization," which has the potential of being pertinent to a number of occurrences. Consequently, category 4 has been renamed "Improper Waste Characterization," and category 7 has been reserved. All previous occurrences that had the NOC of 4 and 7 assigned to them in the PATS database have been reexamined and assigned a more appropriate designation. The category 8C, "Quality Assurance," pertaining to ORs attributable to others, was also reserved, though no records of the PATS_OR database were attributed to that category.

The PATS_OR database was queried to obtain a grouping of the ORs by NOC classification and onsite or offsite designation. Again, any occurrence that happens in an area which is within the boundaries of a DOE site or facility that is fenced or otherwise access-controlled is defined as an onsite occurrence. Offsite occurrences are those occurrences that happen in any area within or outside a DOE site to which the public has free and unlimited access. Table 3 lists the results of the query for ORs that were reported during FY 1994. Table 4 lists the NOC classification of all ORs currently in the database, covering package- or transportation-related ORs selected from September 1, 1990, through October 1, 1994.

Table 3 shows that the majority of ORs in FY 1994 were created by others, with ORs classified as "contamination" related or "shipping preparation" following closely. This is consistent with the reporting of last year, although contamination-related ORs rather than those created by others was the largest category. The table further shows that most of the contamination ORs occurred onsite, whereas the shipping preparation and modal safety ORs are almost equally split between offsite and onsite (consistent with last year's tabulation). The ORs caused by "others" this FY amount to 26% of the occurrences, which is 10% greater than the percentage reported for FY 1993. However, there were 268 total packaging- and transportation-related ORs identified in FY 1993 instead of the 186 selected this FY.

Table 2. PATS NOC categories

-
1. Contamination/Release
 - 1A. Radioactive
 - 1A1. Environmental
 - 1A2. Personnel
 - 1A3. Equipment
 - 1B. Hazardous Materials
 - 1B1. Environmental
 - 1B2. Personnel
 - 1B3. Equipment
 2. Packaging
 - 2A. Damaged
 - 2B. Incorrect Selection
 - 2C. Incorrect Procedures
 3. Storage Incident to Transport
 4. Improper Waste Characterization
 5. Shipment Preparation
 - 5A. Shipping Papers
 - 5B. Marking
 - 5C. Labeling
 - 5D. Loading and Tie-downs
 - 5E. Placards
 6. Modal Safety
 - 6A. Motor or Driver Safety
 - 6B. Aircraft Safety
 - 6C. Rail Safety
 - 6D. Barge Safety
 - 6E. Pipeline
 7. Reserved
 8. Occurrence Created by Others (non-DOE or DOE/Contractor)
 - 8A. Shipping Preparation
 - 8B. Packaging
 - 8C. Reserved
 - 8D. Vehicle or Driver Safety
 - 8E. Contamination
 - 8F. NOS
-

Table 3. FY 1994 ORs classified by PATS NOC

PATS NOC categories, FY 1994			
NOC category	Onsite	Offsite	Total
1	32	7	39
2	17	4	21
3	0	0	0
4	3	4	7
5	18	21	39
6	15	17	32
7	0	0	0
8	4	44	48
TOTAL ORs:	89	97	186

Notes: PATS NOC Codes

1. Contamination/Release
2. Packaging
3. Storage Incident to Transport
4. Improper Waste Characterization
5. Shipment Preparation
6. Vehicle or Driver Safety
7. Reserved
8. Occurrences Created by Others

Table 4. ORs of PATS_OR database classified by PATS NOC

PATS NOC categories reported from 9/01/90 to 10/01/94			
NOC category	Onsite	Offsite	Total
1	135	39	174
2	46	15	61
3	15	2	17
4	11	9	20
5	65	73	138
6	67	61	128
7	0	0	0
8	6	139	145
TOTAL ORs:	345	338	683

Notes: PATS NOC Codes

1. Contamination/Release
2. Packaging
3. Storage Incident to Transport
4. Improper Waste Characterization
5. Shipment Preparation
6. Vehicle or Driver Safety
7. Reserved
8. Occurrences Created by Others

Complementing the general presentation of Table 4 is Table 5, which presents the PATS NOC categories on a percentage basis by FY. Table 5 is based on report quarters for those years (1993 onward) that PATS was selecting and reporting data from the ORPS; otherwise the data are based on notification report dates obtained from the ORPS. Even with this combination of reporting periods, remarkable consistency is shown throughout the FYs.

The decrease of contamination-related ORs from FY 1993 to FY 1994 may not be significant since the FY 1994 percentage is in good agreement with the FY 1991 and 1992 figures. (Another year of reporting will reveal whether the decrease is a trend.) Even though FY 1994 percentages for occurrences created by others is higher than those in FY 1993, the percentage is in agreement with FY 1991 and 1992 figures. The total ORs per year are included in the last row of the table for a better representation of the relationship of the percentages. Comparing the NOC percentages per FY shows that occurrences continue to fall into same groupings. The historically consistent pattern of reporting to the ORPS validates the PATS methodology of assigning NOCs.

Table 5. Percentage of ORs by FY based on notification date

PATS NOC	Percent totals by FY			
	1991	1992	1993	1994
1	23.4	19.7	32.1	21.0
2	7.5	11.5	6.7	11.3
3	1.9	1.6	4.9	0.0
4	2.8	3.3	2.2	3.8
5	16.8	19.7	21.3	21.0
6	25.2	19.7	16.8	17.2
7	0.0	0.0	0.0	0.0
8	22.4	24.6	16.0	25.8
Total ORs:	107	122	268	186

To present even more detail, all occurrences of the PATS_OR database were searched for the NOC by quarter of the FY quarter that they appeared in the PATS *Weekly Report* or--if historical ORs--by their notification dates. Since ORPS is notified of some reports on dates that are much later than the origination date of the occurrence, there exists a possibility that some reports' notification dates will not neatly lie within a reporting quarter. Such overlap is often seen during the first and last week of a quarter. In anticipation of this conflict, PATS groups ORs by the

report quarter that they were selected from ORPS as being packaging- or transportation- related, not by their notification dates. Hence, the report quarter that PATS selected the occurrence is used to compare the ORs whenever feasible. Figure 6, which represents Table 5, presents the total ORs for the FY 1991–1994 on a percentage basis categorized by NOC. Tables 6–9 detail the occurrences by NOC for each category and by quarters of the respective FYs.

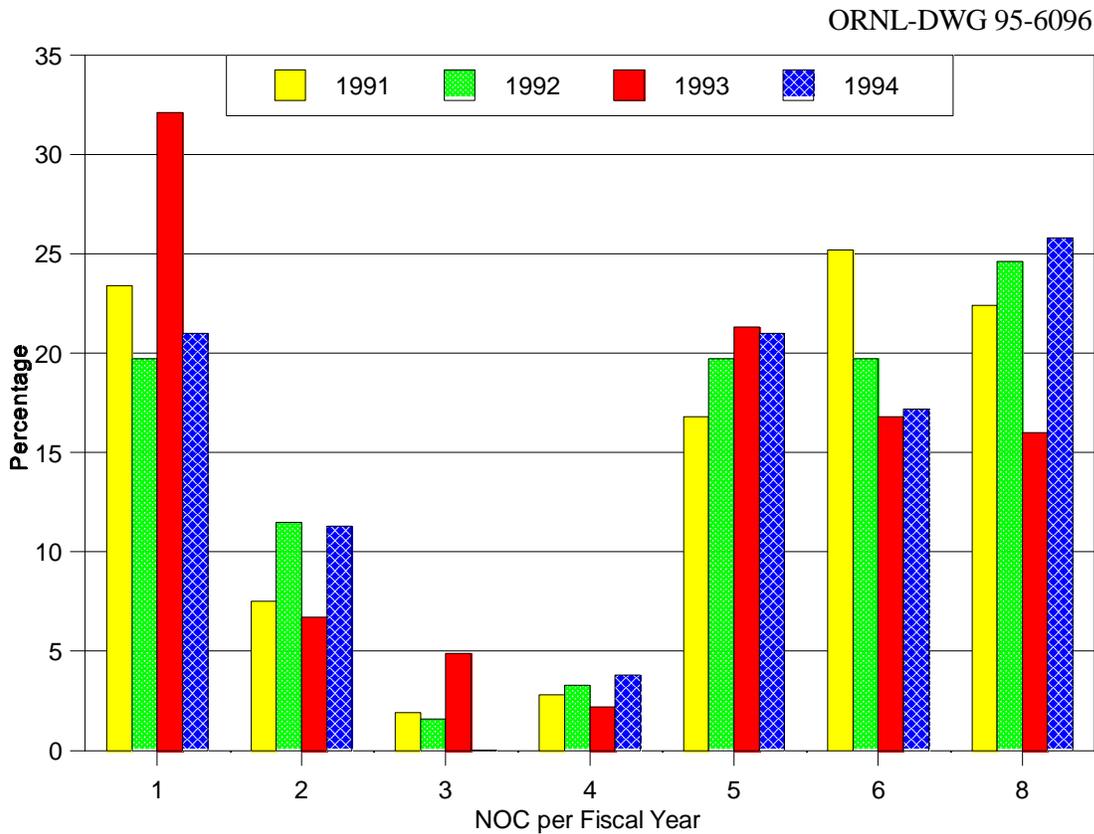


Fig. 6. Percent ORs by FY categorized by NOC.

Table 6. ORs of FY 1991 classified by NOC

	NOC category							
Quarter	1	2	3	4	5	6	8	Total
First	8	4	1	0	4	10	7	34
Second	9	2	0	1	5	7	8	32
Third	3	1	1	0	5	6	5	21
Fourth	5	1	0	2	4	4	4	20
NOC sum	25	8	2	3	18	27	24	107

Table 7. ORs of FY 1992 classified by NOC

	NOC category							
Quarter	1	2	3	4	5	6	8	Total
First	6	4	0	1	7	5	7	30
Second	11	3	1	0	4	4	6	29
Third	5	5	1	1	9	7	7	35
Fourth	2	2	0	2	4	8	10	28
NOC sum	24	14	2	4	24	24	30	122

Table 8. ORs of FY 1993 classified by NOC

	NOC category							
Quarter	1	2	3	4	5	6	8	Total
First	19	2	2	1	9	8	3	44
Second	22	6	9	3	14	7	10	71
Third	21	4	2	2	19	14	17	79
Fourth	24	6	0	0	15	16	13	74
NOC sum	86	18	13	6	57	45	43	268

Table 9. ORs of FY 1994 classified by NOC

Quarter	NOC category							Total
	1	2	3	4	5	6	8	
First	10	3	0	0	11	9	17	50
Second	5	7	0	2	9	6	8	37
Third	11	6	0	0	11	5	12	45
Fourth	13	5	0	5	8	12	11	54
NOC sum	39	21	0	7	39	32	48	186

The most noticeable change that occurred in the level of reporting of occurrences is shown by the higher percentage of ORs related to contamination (NOC 1) reported during FY 1993 (See Table 5 and Fig. 6). The previous years showed a constant average of about 21%. Then the large increase in FY 1993 is followed by a marked decline in FY 1994. See Figs. 7 and 8 for a more conspicuous presentation of this case. To determine what may have resulted in this decrease, the frequency of reporting incidents involving contamination was studied by the reporting contractor.

Evaluation of Table 9 revealed that in FY 1994 Uranium Mill Tailings Remedial Actions Project (UMTRA) accounted for 20.5% of the ORs coded as contamination (8 of the 39 reported), Westinghouse Savannah River Company (WSRC) accounted for 10.3%, and contractors reporting to HQ [Bechtel Petroleum Operations, Inc. (BPOI), in this case] accounted for only 5.1%. On the other hand, evaluation of the total contamination-related ORs shown in Table 8 shows that in FY 1993 UMTRA accounted for 13.9% (12 of 86) of the contamination-related ORs, WSRC accounted for 8% (7 of 86) and contractors reporting to HQ accounted for 12.8% (11 of the 86 reported).

Most sites uniformly decreased the number of ORs reported to ORPS during the CYs, suggesting a better understanding of the reporting requirements or an improvement in the quality of their operation. The former reason may be more appropriate. A quick glance at the percent of ORs reported during FY 1993 and 1994 by UMTRA would give the impression that the number of ORs remained relatively constant, as did reports by WSRC. However further analysis reveals that the nature of the occurrences reported by UMTRA in CYs 1993 and 1994 differ significantly. In CY 1994 UMTRA reported only two occurrences, both of which involved personnel contamination. Yet, in CY 1993 UMTRA's environmental contamination by spills from transport vehicles accounted for 17 of the total 18 contamination-related occurrences reported by UMTRA.

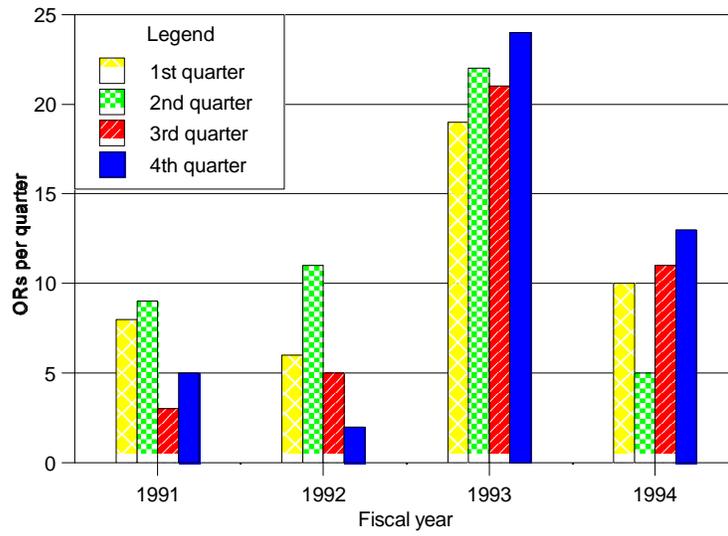


Fig. 7. Category 1 NOC by FY.

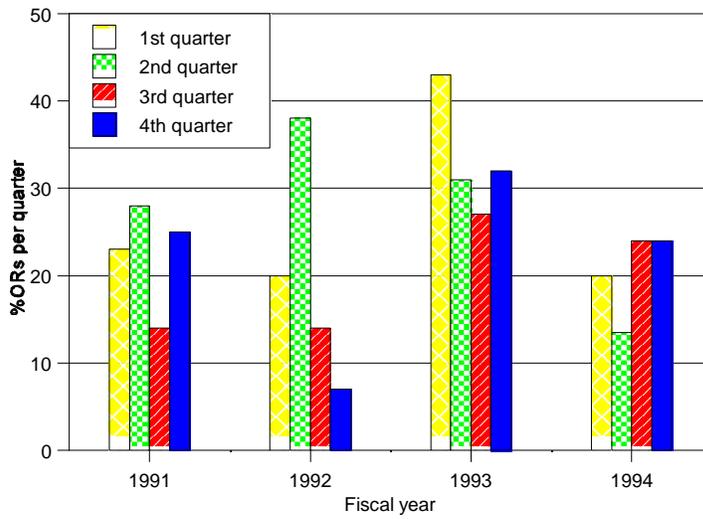


Fig. 8. Category 1 NOC by percentage.

To get a clearer understanding of why this decline occurred, Jacobs Engineering Group, Inc., the UMTRA contractor, was contacted. Two factors were given for there being fewer ORs reported: (1) utilizing an existing DOT exemption which requires spills to be reported only if they exceed 15 lb, and (2) modifications to the haul trucks which have been significant in decreasing minor leaks.

Table 10 shows the number of ORs reported by contractors to their respective Program Offices during FY 1994. Table 11 shows the number of ORs reported by the contractors to their respective Operations Offices during FY 1994. Figures 9 and 10 are a graphical representation of this data.

Table 10 reveals that Environmental Restoration and Waste Management (EM), with 83 ORs for FY 1994, was the Program Office that the most occurrences were reported to (consistent with last year). The second largest receiver of ORs was Defense Program (DP), which had 70. Both of these Program Offices had a significant number of ORs that were attributable to others (about 25% each, which is comparable to the overall percentage of 26%). The Operations Office that reported the most occurrences to EM was Richland Operations (RL) with 27. The Operations Office under DP which received the most ORs from its contractors was Albuquerque Operations (ALO), which reported 36. This reporting is similar to the results of last year's analysis.

Table 10. OR distribution by DOE Program Office

Code	Description	No. of ORs	
		Owner	Others
DP	Defense Programs	52	18
EE	Energy Efficiency and Renewable Energy	0	1
EM	Environmental Restoration and Waste Management	63	20
ER	Energy Research	11	6
FE	Fossil Energy	5	2
NE	Nuclear Energy	7	0
RW	Radioactive Waste Management	0	1
	SUB TOTAL	138	48
	GRAND TOTAL	186	

Table 11. OR distribution by DOE Operations Office

Code	Description	No. of ORs	
		Owner	Others
ALO	Albuquerque Operations	43	7
CH	Chicago Operations	9	1
HQ	DOE-HQ	7	3
ID	Idaho Operations	6	3
NVO	Nevada Operations	4	1
OAK	Oakland Operations	6	6
ORO	Oak Ridge Operations	24	12
RFO	Rocky Flats Operations	6	3
RL	Richland Operations	22	8
SR	Savannah River Operations	11	4
	SUB TOTAL	138	48
	GRAND TOTAL		186

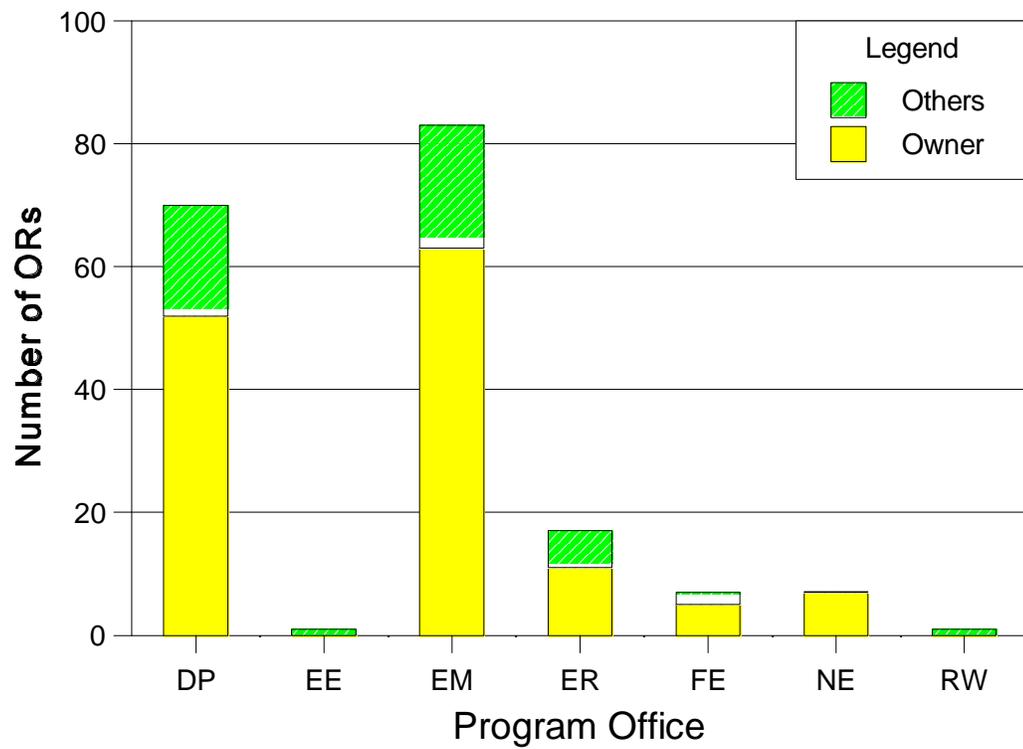


Fig. 9. OR distribution by DOE Program Office.

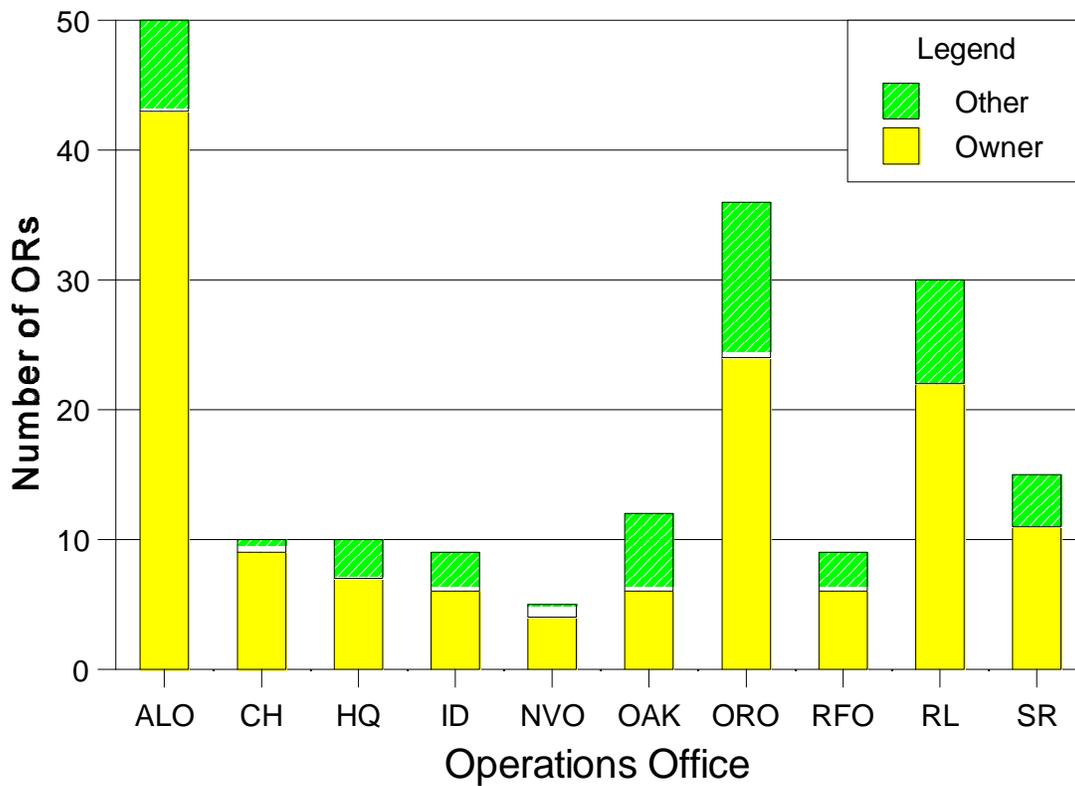


Fig. 10. OR distribution by DOE Operations Office.

4. ROOT-CAUSE ANALYSIS

Root cause is defined by DOE's *Root Cause Analysis Guidance Document* as

"...the fundamental cause that, if corrected, will prevent recurrence of this or similar events. The root cause does not apply to this occurrence only, but has generic implications to a broad group of possible occurrences, and it is the most fundamental aspect of the cause that can logically be identified and corrected."

The root cause seeks to determine the "why" of an occurrence. Root-cause is assigned by the facility and reported to ORPS; in this report this process will be called "ORPS-assigned" root-cause to distinguish it from PATS-assigned NOC coding. Table 12 presents the ORPS root cause codes from DOE 5000.3B.

Occurrences were examined for the determination of the root cause by the facility. No changes or interpretations were made to the ORPS-assigned root cause. Root-cause assignment for the total ORs in the PATS_OR database is given in Table 13. Because root-cause codes are generally assigned only to final reports, the reports listed in the table are final ORs. Table 14 gives a matrix of the PATS NOC codes and the ORPS root-cause codes. Note that because the previous total number of ORs in the database includes ten-day reports as well as finals, earlier tables (such as Table 9) total more than Table 13 and 14 because their total is based on final ORs.

Table 13 shows that facilities have assigned personnel error and management problems as the most frequent root cause, almost equally. The third highest cause of the incidents was assigned to equipment/material problems. Remarkably, these three predominant root causes were the same root causes that were assigned most in calendar year 1993 and, furthermore, are in the same sequence and nearly the same proportion. These three areas have historically been the three most likely causes of occurrences, and this trend will likely occur in the future. EH-32 is aware of this trend and is creating and soon implementing programs to assist contractors with addressing these problem areas.

Table 14 shows the PATS NOC code cross-referenced with the ORPS-assigned root cause. This very useful table gives the analyst a lead as to the relationship between the "what" and the "why." Hence, more information is available on which to (1) assess the effectiveness of the root cause assignment, (2) judge the appropriateness of corrective actions, and (3) possibly use this additional information to prevent recurrence. The chart shows that 37% of contamination incidents (NOC code 1) have been caused mainly by management problems (root-cause code 6) and 27% of contamination incidents have been caused by equipment/material problems (root-cause code 1). Inadequate administrative control was the main reason given for management problems being selected as the root of the contamination incidents. Further, 44% of shipping preparation incidents (NOC code 5) have also been caused mainly by management problems (root-cause code 6) and 25% of shipping preparation incidents have been caused by personnel error (root-cause code 3). Modal safety incidents (NOC code 6) have been

Table 12. ORPS root-cause codes (ORPS User's Manual, DOE/ID-10319)

1. Equipment/material problem
 - 1A. Defective or failed part
 - 1B. Defective or failed material
 - 1C. Defective weld, braze, or soldered joint
 - 1D. Error by manufacturer in shipping or marking
 - 1E. Electrical or instrument noise
 - 1F. Contamination

 2. Procedure problem
 - 2A. Defective or inadequate procedure
 - 2B. Lack of procedure

 3. Personnel error
 - 3A. Inadequate work environment
 - 3B. Inattention to detail
 - 3C. Violation of requirement or procedure
 - 3D. Verbal communication problem
 - 3E. Other human error

 4. Design problem
 - 4A. Inadequate man-machine interface
 - 4B. Inadequate or defective design
 - 4C. Error in equipment or material selection
 - 4D. Drawing, specification, or data errors

 5. Training deficiency
 - 5A. No training provided
 - 5B. Insufficient practice or hands-on experience
 - 5C. Inadequate content
 - 5D. Insufficient refresher training
 - 5E. Inadequate presentation or materials

 6. Management problem
 - 6A. Inadequate administrative control
 - 6B. Work organization/planning deficiency
 - 6C. Inadequate supervision
 - 6D. Improper resource allocation
 - 6E. Policy not adequately defined, disseminated, or enforced
 - 6F. Other management problem

 7. External phenomenon
 - 7A. Weather or ambient condition
 - 7B. Power failure or transient
 - 7C. External fire or explosion
 - 7D. Theft, tampering, sabotage, or vandalism
-

Table 13. FY 1994 ORs of database classified according to root cause

No.	ORPS root-cause code	Onsite	Offsite	Total
1	Equipment/Material Problem	14	9	23
2	Procedure Problem	9	10	19
3	Personnel Error	20	29	49
4	Design Problem	4	2	6
5	Training Deficiency	4	2	6
6	Management Problem	22	23	45
7	External Phenomenon	0	2	2

Table 14. FY 1994 PATS NOC codes and ORPS root-cause codes

Root Cause	PATS NOC Code								Total
	1	2	3	4	5	6	7	8	
1	8	2	0	0	0	5	0	8	23
2	3	4	0	3	3	1	0	5	19
3	5	3	0	1	8	15	0	17	49
4	3	0	0	0	2	1	0	0	6
5	0	1	0	0	5	0	0	0	6
6	11	7	0	2	14	6	0	5	45
7	0	0	0	0	0	1	0	1	2
Total	30	17	0	6	32	29	0	36	150

Notes: ORPS Root-Cause Codes

1. Equipment/Material Problem
2. Procedure Problem
3. Personnel Error
4. Design Problem
5. Training Deficiency
6. Management Problem
7. External Phenomenon

PATS NOC Codes

1. Contamination/Release
2. Packaging
3. Storage Incident to Transport
4. Improper Waste Characterization
5. Shipment Preparation
6. Modal Safety
7. *Reserved*
8. Occurrences Created by Others

overwhelmingly been caused by personnel error (52%). Finally, occurrences caused by others have been attributed to equipment/material problems (22%) and personnel error (47%).

The appearance of the chief causes of occurrences is equally notable in Table 14 as it was in Table 13. In 1993, occurrences caused by others were attributed to equipment/material (36%) and personnel error (30%) root causes. Excluding the occurrences caused by “others” change for 1994 over 1993, other instances cited in the previous paragraph have the exact trend shown in CY 1993 with approximately the same percentage of assignment.

From the last column of Table 14, it can be seen that personnel error was the main root cause assigned for occurrences. Before one assumes that the personnel errors resulted from a lack of training, note that training deficiency, root-cause code 5, was cited only 4% of the time as a cause of occurrences. So, personnel error is revealed not because of a lack of training. Using the more detailed classification of Table 12 (ORPS root-cause codes) and analyzing the root cause field of the database revealed that the chief reasons for personnel error were inattention to detail (3B) and violations of requirements or procedure (3C), both with 19 occurrences of the 49 reported (39% each). In view of these assignments, it would seem that there would be little that Operations Offices can directly do to decrease the amount of occurrences that result from personnel error. It is ultimately up to the trained individual to be vigilant and alert. Contractor management must take the lead in sensitizing operations personnel to their responsibilities and roles in ensuring safety and good work practices.

However, personnel error cannot be entirely blamed on the individual. This is implied by 36% (16 of 45) of management problems attributed to policy not being adequately defined, disseminated, or enforced (6E). Combining this fact with the previous fact that 19 of the 49 occurrences that were reported to have a root cause of “personnel error” are violations of requirements or procedure could suggest the need to make procedures and requirements more detailed, understandable, or available. While training may be adequate, it is suggested that operations management needs to translate class-room training lessons and exercises into field procedures and guidelines.

Section 3 of this report established the validity of the categorization of ORs by NOC coding. Table 10 shows that PATS NOC coding can be used with ORPS–assigned root cause coding to present more meaningful data. Classification by NOC provides a useful tool and complements the root cause assignment of ORPS. PATS strives to classify the ORs consistently and does performs quality checks of its work to assure uniformity. If the contractors are equally consistent with their assignment of root-cause codes, then the value of a chart such as Table 14 increases tremendously.

The evaluation regarding personnel error is a sample of the opportunity that Table 14 affords for understanding the cause of some preventable occurrences and the means of addressing them. It can give valuable guidance for program direction. Technical assistance programs should focus on the root causes of the most prevalent occurrences. Assessments by HQ and Operations Offices should look to the chart for clues as to any underlying problems of a particular site. Quality

assurance programs and onsite assessment teams can use the chart to pin-point programmatic weaknesses and areas where violations are most likely to occur. Analysis of this chart could provide the basis for future programs, assuring that limited monies and technical resources are allocated to the areas which can be most productive in reducing deficiencies.

5. EVALUATION OF EFFECTIVENESS OF CORRECTIVE ACTIONS

To determine the appropriateness of reported corrective actions to remedy an occurrence and prevent recurrence, all corrective action of occurrences related to packaging (NOC 2) or to shipment preparation (NOC 5) were evaluated. All corrective actions of ORs categorized in the ORPS as unusual or emergency were also evaluated, in addition to a random selection of over half of the ORs that currently have a report status of ten-day updates.

It should be emphasized that it requires more than reviewing a site's suggested corrective actions to determine whether an action is suitable to close out an OR and prevent recurrence. More details surrounding the closeout, an understanding of site procedure, and the occurrence history need to be known. Therefore, the evaluations made on the effectiveness of close out must be seen as technical judgment based on a limited presentation of facts and information contain the OR itself. The evaluation does give a guide of how a packaging and transportation specialist or independent appraiser may view a site's corrective actions. In all likelihood, the appraiser would choose to follow up on the OR and corrective actions as part of his review and evaluation.

5.1 EVALUATION CRITERIA

To evaluate the effectiveness of proposed corrective actions, the following evaluation criteria have been established:

1. *Satisfactory.* The implementation of the corrective actions should correct the deficiency and significantly reduce the likelihood of recurrence;
2. *Conditional.* The implementation of the corrective actions should correct the deficiency but may not significantly reduce the likelihood of recurrence; the actions may be sufficient, but more details and assurances are needed to positively make the determination; and
3. *Unknown.* The corrective actions do not appear to adequately resolve the deficiency and/or address recurrence; more information is needed on the details of the corrective actions and their implementation plan.

The selection of a criterion is the technical judgment of the evaluator. Stating that effects of corrective actions are "unknown" does not imply that the contractor has failed to propose adequate steps to address the inadequacy; rather, it says that the contractor has not presented enough information or details to evaluate the incident based on the limited input of the OR and a brief contact with the contractor. It is ultimately up to the contractor's Operation Office to make the determination of adequacy.

In the following tables, the report number is followed by a very brief description of the incident and an evaluation of the proposed corrective actions based on the criteria above. A more detailed description of the OR and its associated corrective actions can be found in Appendix A.

5.2 CORRECTIVE ACTION EFFECTIVENESS FOR VARIOUS CATEGORIES OF ORS

During the reporting period, 11 ORs were categorized as unusual and one as emergency. Other than the single emergency occurrence (shown in with an “E” after the report number), only reports with the “unusual” designation assigned to the occurrence category are included in Table 15.

Twenty-one ORs were categorized as having a NOC of 2. Two of these ORs are currently assigned an occurrence category of *unusual* and were previously included in the evaluation of unusual ORs (Table 15) and will not be duplicated in the listing of Table 16, “Evaluation of effectiveness of corrective actions for ORs with NOC 2.” Thirty-nine ORs were categorized as having a NOC of 5 (Table 17); one of the ORs was later canceled because it was determined to not meet the reportability threshold in DOE Order 5000.3B. Two of the ORs categorized as NOC 5 previously reported in Table 15 have an occurrence category of *unusual* and will not be duplicated in the listing of Table 17.

To analyze other categories than NOC 2 and 5, a sampling of ORs that have ten-day updates was taken (Table 18). Ten-day updates were chosen simply because the additional information supplied therein may be sufficient to suggest corrective actions and, therefore, allow a better determination of the effectiveness of the proposed actions than that provided by notification reports. However, since they are ten-day update reports and the incidents have not been fully evaluated, it is acknowledged that the reports may not have corrective actions assigned to them, and, if they do, that the corrective actions may be tentative.

Of the 75 reports selected to be examined, 72% were judged satisfactory, and 21 of the 75 were considered to be conditional or unknown based on the detail presented in the proposed corrective actions.

Table 15. Evaluation of effectiveness of corrective actions for ORs categorized as emergency or unusual

Report Number	Description	Effectiveness
ALO-LA-LANL-LANL-1994-0005	Soil containing hazardous constituents was improperly disposed of at an unlicensed site.	Unknown
CH--AMES-AMES-1994-0002	Radioactive waste was shipped to a Tennessee company without having the required authorization license.	Satisfactory
HQ--BPOI-NPRC-1994-0007	A spill of approximately 120 bbl of crude oil and 180 bbl of produced water occurred.	Satisfactory
HQ--GOME-METC-1994-0012	A commercial aircraft crashed causing the death of all 132 passengers, four of whom were METC employees.	Satisfactory
ID--EGG-ERATOWNFAC-1994-0004	A privately-owned pickup truck struck an INEL-owned van, which was preparing to make a proper turn.	Satisfactory
ID--WINC-FUELCSTR-1994-0008	Eight lid-closure bolts were been used to close a fuel handling cask though procedures required 24.	Satisfactory
RFO--EGGR-SUPPORT-1994-0018	A pedestrian, an EG&G employee, was struck by a personal vehicle driven by another EG&G employee.	Satisfactory
RFO--EGGR-WSTREPACK-1994-0001	Thirty-five gallons of sludge-free, decanted pond water were released to the asphalt which being transferred.	Unknown
RFO--EGGR-WSTREPACK-1993-0003 [E]	A tanker containing 10,000 lb of propane skidded off the road due to drivers confronting poor driving conditions.	Satisfactory
RL--WHC-TRANS&PKG-1994-0002	Twenty-one drums—three above the limit approved in the SARP—were transported onsite within a container.	Unknown
RL--WHC-WHC600EM-1993-0016	Five 55-gal drums of contaminated soils were removed without authorization and dumped in a sanitary landfill.	Satisfactory
SAN--LLNL-LLNL-1994-0009	An unmanned aerial vehicle became uncontrollable and crashed within the prescribed test flight area.	Satisfactory

Table 16. Evaluation of effectiveness of corrective actions for ORs with NOC 2

Report Number	Description	Effectiveness
ALO--WWID-WIPP-1994-0002	A 4-L bottle of methanol was transported off-site in a private vehicle.	Satisfactory
ALO-AO-MHSM-PANTEX-1994-0112	Improperly labeled samples were transported without being correctly packaged.	Satisfactory
ID--EGG-TANO-1993-0005	A shipment of Type A certifiable sludge was not packaged in a Type A container.	Satisfactory
ID--EGG-TRA-1994-0001	A shipment of a radioactive liquid waste tanker contained several violations of the transport plan.	Satisfactory
ID--EGG-TRAHC-1993-0012	The SARP used for a model 702 cask was outdated.	Conditional
ID--EGG-TRAHC-1994-0001	An over-pack container had been used to ship iridium 11 times, though it was not approved for iridium use.	Satisfactory
ORO--MKFO-Y12CENTENG-1993-0026	A fire was thought to have been caused by a pin-hole leak from an old acetylene gas cylinder.	Unknown
ORO--MMES-X10REDC-1994-0004	An employee was injured by a drum lid propelled into the air from over-pressurization of drum contents.	Conditional
ORO--MMES-Y12WASTE-1994-0004	The lid from a sealed 55-gal drum was propelled from a drum into the air because of overpressurization.	Conditional
RFO--EGGR-NONPUOPS1-1994-0007	A 1-gal can contained an unidentified, viscous sample, which was inside a lead-lined glove and double-bagged.	Satisfactory
RL--WHC-LIQUIDEFL-1994-0003	The valves in the cupola of a tank car were found to be open instead of closed as is required by procedure.	Satisfactory
RL--WHC-TANKFARM-1994-0011	A Type B plutonium source was shipped onsite as Type A material.	Satisfactory
RL--WHC-TANKFARM-1994-0012	Backlogged waste containers were found to contain solid material that had not been properly labeled.	Satisfactory
RL--WHC-TPLANT-1994-0002	Two plastic-wrapped low-level waste items were shipped even though they contained accumulated water.	Satisfactory
RL--WHC-WHC1100EM-1993-0028	An audible beep was heard coming from a damaged package containing an electronic scale.	Satisfactory
RL--WHC-WHC200EM-1993-0055	A radioactive source containing ⁹⁰ Sr was improperly packaged and shipped without documentation.	Satisfactory
SAN--LLNL-LLNL-1994-0040	Two stored, crimp-sealed cans which contained plutonium oxide/ash were found to be bulging.	Satisfactory
SR--WSRC-FCAN-1994-0037	Two of the ten clamps of a B-25 Waste Burial Box were found to be rusty and ineffective as a seal.	Satisfactory
SR--WSRC-RMAT-1994-0014	Tamper-indicating device seals used on 6M shipping containers were found to be inadequate.	Satisfactory

Table 17. Evaluation of effectiveness of corrective actions for ORs with NOC 5

Report Number	Description	Effectiveness
ALO--TSD-TSS-1994-0001	Two special assemblies shipped offsite without authorization or procedure.	Satisfactory
ALO-AO-MHSM-PANTEX-1994-0028	High-explosives plug found inside supposedly empty container.	Satisfactory
ALO-AO-MHSM-PANTEX-1994-0090	Noncompliance with DOT requirements movement of samples.	Satisfactory
ALO-KO-SNL-7000-1994-0006	A radioactively contaminated sample was shipped to a contract laboratory.	Satisfactory
ALO-LA-LANL-CHEMLASER-1994-0001	A 55-gal drum of vacuum pump oil was not in compliance with requirements.	Satisfactory
ALO-LA-LANL-DPWEST-1993-0001	The shipping papers of hazardous material bound for the United Kingdom were not in compliance.	Conditional
ALO-LA-LANL-ESHSUPT-1994-0001	An improperly packaged ⁶⁰ Co test source set off a building alarm upon the mailman's entry.	Satisfactory
ALO-LA-LANL-MATSCMPLX-1994-0002	An improperly packaged ⁶⁰ Co test source set off a building alarm upon the mailman's entry.	Satisfactory
ALO-LA-LANL-MEEFAC-1993-0001	A 16-ounce bottle of flammable liquid was transported 3 miles over a public access road without proper forms.	Satisfactory
ALO-LA-LANL-PHYSCOMPLX-1994-0002	An encapsulated beryllium oxide target was transported on public highways without proper shipping papers.	Satisfactory
ALO-LA-LANL-RADIOCHEM-1994-0003	A shipment of uranium powder was received at LANL from a laboratory without being properly coordinated.	Unknown
ALO-LA-LANL-SIGMA-1994-0003	A radioactive materials transfer form indicated that it contained one package instead of six.	Satisfactory
ALO-LA-LANL-TA18-1994-0003	A 600-lb, sealed, radioactive-source assembly was dropped from the bed of a transport truck.	Satisfactory
ALO-LA-LANL-TA55-1994-0004	A discrepancy between the number of packages received and the number listed on a manifest was discovered.	Satisfactory
CH-AA-ANLE-ANLEERD-1994-0001	An unlabeled fiber drum containing radioactive liquid residue was placed in the normal trash stream.	Satisfactory
CH-AA-ANLE-ANLEERD-1994-0002	A data logger containing a lithium battery pack was transported by aircraft improperly classified and marked.	Unknown
CH-AA-ANLE-ANLEEWM-1994-0003	One drum of a 56-drum shipment of mixed waste was incorrectly marked as a limited quantity of rad material.	Satisfactory
CH-AA-ANLE-ANLEEWM-1994-0004	A waste shipment was shipped as nonregulated, but should have been shipped as radioactive.	Satisfactory

Table 17 (continued)

Report Number	Description	Effectiveness
CH-BH-BNL-BNL-1993-0029	A drum containing PCB-contaminated waste oil was improperly manifested.	Unknown
NVOO--REEC-EMD3-1993-0001	Two shipments were manifested as "Fissile Exempt" instead of "Fissile."	Satisfactory
ORO--FERM-FEMP-1993-0056	Scrap material containing lead was improperly described.	Satisfactory
ORO--FERM-FEMP-1994-0054	The load on an overloaded tractor trailer shifted when a pin on the right shoe of the loading gear snapped.	Conditional
ORO--MMES-K25GENLAN-1993-0037	A DOT audit of the three Oak Ridge sites uncovered nine violations of DOT regulations.	Satisfactory
ORO--MMES-Y12DEFFGM-1993-0096	A potential shipper/receiver difference was identified on a shipment of weapon trainer units.	Satisfactory
ORO--MMES-Y12SITE-1994-0015	A 1979-kg depleted uranium billet fell from a skid to the pavement when the securing strap broke.	Satisfactory
ORO--MMES-Y12WASTE-1994-0005	A flatbed trailer carrying 13 bales of compacted sanitary waste partially overturned when the load shifted.	Unknown
RFO--EGGR-SOLIDWST-1994-0065	Five waste drums without radioactive material labels were improperly transferred to another building.	Satisfactory
RFO--EGGR-UTILITIES-1994-0007	A platform ladder/stairwell loaded on a flatbed trailer struck an overhead signal cable.	Unknown
RL--WHC-ANALLAB-1993-0023	A regulated hazardous waste (1.5% silver) was mistakenly shipped in a drum containing low level waste.	Satisfactory
RL--WHC-SOLIDWASTE-1993-0034	Personnel not certified according to HM-126F prepared, shipped, and received offsite waste.	Satisfactory
RL--WHC-SOLIDWASTE-1993-0044	A Type A shipment of tritium waste was shipped using an outdated Storage/Disposal Approval Record.	Satisfactory
RL--WHC-SOLIDWASTE-1994-0022	A 55-gal steel drum broke the rear window of the transporting truck's cab when the drum shifted.	Conditional
SAN--SU-SLAC-1994-0003	A mixed waste shipment was made with an improper manifest.	Conditional
SR--WSRC-FSD-1994-0002	A hazardous material sample was shipped offsite as a non-hazardous shipment.	Satisfactory
SR--WSRC-WVIT-1993-0057	A tanker thought to be empty was found to contain 301 gallons of hazardous, synthetic sludge.	Conditional
SR--WSRC-WVIT-1994-0045	An unplacarded tanker containing a DOT-allowed hazardous-material residue was shipped to a vendor.	Satisfactory

Table 18. Evaluation of effectiveness of corrective actions for selected updated ORs

Report Number	Description	Effectiveness	NOC
ALO-LA-LANL-HEMACHPRES-1994-0002	A truck located in an uncontrolled area was found to be contaminated with beta-gamma radiation.	Unknown	1A3
ALO-LA-LANL-SIGMA-1994-0007	A spot of removable, beta-gamma contamination was found in a truck which was to be sold to the public.	Unknown	1A3
ORO--FERM-FEMP-1994-0051	An improperly placarded shipment arrived at FEMP from IT Corporation.	Unknown	8A
ORO-MMES-PORTCASOPS-1994-0005	Contaminated articles were transported to an unauthorized landfill and buried.	Unknown	1A1
RL--WHC-LIQUIDEFL-1994-0009	Three burial boxes and 55 drums of LLW were buried in a trench not classified for that activity level.	Satisfactory	4
SAN--LLNL-LLNL-1994-0022	A container of 50% hydrogen peroxide solution was discovered to be leaking; the shipment was mislabeled.	Satisfactory	8A
SAN--LLNL-LLNL-1994-0036	A vendor failed to label silver nitrate as an oxidizer.	Satisfactory	8A
SAN--LLNL-LLNL-1994-0053	Waste soil was sent offsite for disposal at a landfill, exceeding the disposal site's waste acceptance criteria.	Satisfactory	4

6. CONCLUSIONS

The PATS program selectively identifies occurrence reports for their transportation and/or packaging impacts. During FY 1994, out of the 6,626 total occurrences on the ORPS, 186 were identified that had packaging and transportation impacts. This small percentage of the total occurrences, 2.8%, is a slight decrease in percentage from the FY 1993 data, which indicated that 3.3% of the occurrences were transportation related. The statistical data presented in this annual report includes occurrences from FY 1991 through FY 1994. The percentage of transportation occurrences has never exceeded 6.1% (FY 1991), and the overall impacts to the safety of transportation and packaging operations has remained relatively constant. To provide background data to enable program managers to reduce the number of occurrences further, this review has examined the major shippers and their occurrence rate, the specific nature of the occurrence in transportation terms, the root causes and their relationship to the nature of the occurrence, the corrective actions, and the lessons learned. Through this examination and evaluation, the major causes of problems and the corrective actions to prevent recurrence are being identified. These “safety concerns” and “solutions” are reported to the packaging and transportation community through lessons learned bulletins and this annual report.

As a baseline for evaluation of the number of occurrences, the only data available is the DOE Shipment Mobility/Accountability Collection (SMAC), which maintains records on the total number of shipments performed by DOE contractors. Data for hazardous materials shipments conducted offsite may be selected. No similar data are available for onsite transfers. From the SMAC data, the major shippers of hazardous materials were determined, and the numbers of occurrences reported by the major shippers are tabulated by the onsite, offsite, or “others” occurrences. The SMAC data identified 21 contractor shippers who each had greater than 300 hazardous material shipments in FY 1994. The numbers of occurrences per major shipper are consistently low. With the exception of LANL, which had seven offsite occurrences, the major shippers had only one to three offsite occurrences attributed solely to their operations. The historical data from 1991 to 1994 indicate similar results.

For more effective evaluation of the problems related to the transportation and packaging operations of DOE contractors, as reported on the ORPS incident reports, the PATS program developed a coding system for the identification of the transportation-oriented nature of occurrence. Through this coding system, it was determined that almost one-half (21 of 53) of the offsite occurrences not caused by others were related to shipping preparation. The shipping preparation nature of occurrence includes regulatory noncompliances of shipping papers, marking, labeling, placarding, loading, and tie-downs. Modal safety is the second most common nature of occurrence for offsite occurrences (17 of 53 offsite occurrences). Onsite occurrences were coded most frequently as contamination resulting from a transportation-related occurrence (32 of 89 onsite occurrences), closely followed by occurrences related to packaging (17), shipping preparation (18) and modal safety (15). The totals of the historical data again are similar and support the results from FY 1994.

DOE Order 5000.3B requires the occurrence reporting facility to assign a root cause to the occurrence as part of the finalization and closure of the reporting process. Analysis of this data provides more insights into the problems associated with transportation occurrences. Surprisingly, the root causes for onsite or offsite are the same. “Personnel error” and “management problems” overweigh all other causes of occurrences. Examining the major nature of occurrences against the root causes, it is found that:

- for shipment preparation, packaging, or contamination occurrences, the most frequent root cause is management problems; and
- for modal safety and occurrences caused by others, the most frequent cause is personnel error.

This study examined the “personnel error” category in more depth and found that the chief reasons for personnel error were inattention to detail and violations of requirements or procedures. In future reports, management problems will be thoroughly detailed. This conclusion as to the major contributing causes of transportation incidents does provide management, at both DOE and the contractor level, a focus for implementation of technical assistance, mentoring programs, and corrective actions.

The effectiveness of the corrective actions proposed to address occurrences were examined for 75 of the total 186 reports. This included all the emergency or unusual occurrences and all the occurrences coded as packaging or shipment preparation. Criteria were developed for judging the acceptability of the proposed actions; and the reports, corrective actions, and evaluations are summarized in an attachment to this report. Over 70% were evaluated as satisfactory. The evaluation was based primarily on information obtainable directly from ORPS. Updates to some of the “conditional” or “unknown” may have been posted to the ORPS since this evaluation was completed, which could raise the total percentage of satisfactory closures. Reviewing the summaries of corrective actions provides a glimpse of the lessons learned process and could lead transportation professionals to recognize potential problems and how they may apply preventive measures.

The PATS program developed five “lessons learned” bulletins during the year, based on ORPS data and site contact and follow-up. The bulletins were distributed to the DOE community through the PATS Special Interest Group sponsored by EH-32. The subjects of these bulletins were:

PATS LL:3720-94-01, *Verifying Shipping Documentation.*

PATS LL:3720-94-02, *Review of Operations.*

PATS LL:3720-94-03, *Use of Most Current Versions of SARPs.*

PATS LL:3720-94-04, *Maintaining Records for Packagings.*

PATS LL:3720-94-05, *Assisting Non-DOE Contractor Shippers.*

A survey was distributed to the “lessons learned” bulletin recipients, and an overwhelmingly favorable response was received.

As an overall conclusion, the packaging and transportation contractor operations have relatively few occurrences, given the large number of shipments and transfers that occur each year. The trends are showing consistency in the nature of occurrence and the root cause. Additional data should confirm these results. Review of corrective actions indicates that the resolution of the occurrences is proceeding satisfactorily; more follow-up with site contact is suggested to determine if recurrence is actually prevented. The lessons learned from this project have been received enthusiastically by the operators in the field, who have encouraged the continuation of this program.

Appendix A:
EVALUATION OF EFFECTIVENESS OF CORRECTIVE ACTIONS

A.1. CORRECTIVE ACTION EFFECTIVENESS FOR UNUSUAL ORS

ALO-LA-LANL-LANL-1994-0005

Description: Soil containing hazardous constituents was disposed of at a site not licensed for such disposal. Further, the placarding and labeling of the 55-gal drums and 10 truckloads of soil received for disposal did not signify the hazardous constituents. The New Mexico Environment Department assessed a \$26,000 penalty.

Corrective Actions: The remediation plan for the disposal site was evaluated and updated. A moratorium on accepting environmental remediation site waste has been imposed. Procedures have been developed to improve waste characterization and management practices.

Evaluation of Proposed Action: Unknown (Violations of DOT regulations and the transport problem were not addressed.)

CH--AMES-AMES-1994-0002

Description: Ames Laboratory was notified by the State of Tennessee Department of Environment and Conservation (TDEC) that it was in noncompliance with state regulations for protection against radiation. Ames had shipped radioactive waste to the Scientific Ecology Group (SEG), an Oak Ridge, Tennessee, company, without the authorization of a Tennessee license. At issue is whether DOE prime contractors are exempt from requirements relating to the transportation of sources of radiation to or from government-owned sites.

Corrective Actions: The Ames Laboratory letter of response states that "...unless necessary sections of the TDEC regulations are amended, Iowa State University will assure that all shipments of low level waste from Ames Laboratory to any disposal/processing facility in the state of Tennessee are properly brokered." Authorization for SEG to process the "noncompliant" shipment was received.

Evaluation of Proposed Action: Satisfactory

HQ--BPOI-NPRC-1994-0007

Description: A spill of approximately 120 bbl of crude oil and 180 bbl of produced water occurred when a subcontractor vacuum truck driver erroneously dumped the liquids recovered from a previous spill at the disposal facility, which is not designed for crude oil. The liquids collected in a sump, and it is estimated that 90% of the crude oil will be recovered.

Corrective Actions: Cleanup of the area began on discovery. The procedure for disposal of liquids has been clarified with the subcontract vacuum truck service management. Periodic meetings will be held with appropriate subcontractors to prevent any recurrences.

Evaluation of Proposed Action: Satisfactory.

HQ--GOME-METC-1994-0012

Description: A commercial aircraft crashed on approach to the Pittsburgh International Airport. All of the 132 passengers were killed, four of whom were Morgantown Energy Technology Center employees.

Corrective Actions: All necessary notifications were made. The Federal Aviation Administration and the National Transportation Safety Board are in control of the accident site and are coordinating the investigation.

Evaluation of Proposed Action: Satisfactory

ID--EGG-ERATOWNFAC-1994-0004

Description: While an Idaho National Engineering Laboratory (INEL)-owned Ecostar van was preparing to make a left turn into a turning lane, a pickup truck veered into the turn lane and struck the van on the front-end driver's side. Both drivers suffered minor injury, but the Ecostar van was destroyed beyond repair.

Corrective Actions: A vehicle accident investigation report was filed by the City of Idaho Falls Police Department. DOE F 5484.1C was completed and submitted for internal review.

Evaluation of Proposed Action: Satisfactory

ID--WINC-FUELRCTR-1994-0008

Description: Fuel-receiving operations were suspended pending evaluation of the adequacy of using eight lid-closure bolts (designed to be removed underwater) during unloading of the NFS-100 fuel shipping cask. Technical standards require 24 lid-closure bolts during shipment

Corrective Actions: Fuel shipments were stopped in the NFS-100 cask. Other fuel-handling casks were checked to see if fewer than the required number of lid-closure bolts were being used during unloading. Calculations will be performed on the NFS-100 lid closure bolts and recommended changes to operating procedures will be made.

Evaluation of Proposed Action: Satisfactory

RFO--EGGR-SUPPORT-1994-0018

Description: An EGGR employee was struck by a personal vehicle driven by another EGGR employee as she attempted to cross the street approximately 27 ft south of a marked pedestrian crosswalk. The driver was cited for careless driving causing bodily harm.

Corrective Actions: Employee Communications prepared and issued an article on pedestrian and driver safety.

Evaluation of Proposed Action: Satisfactory

RFO--EGGR-WSTREPACK-1994-0001

Description: Approximately 35 gal of sludge-free decanted pond water was released to the asphalt during transport when the lid on the tanker opened. The water was reported to have 1.15 nCi/L alpha and a pH of 10. No radioactive contamination resulted from the spill, though traces of hazardous wastes were present.

Corrective Actions: The area was immediately barricaded from vehicle and pedestrian traffic. The water was removed by vacuuming and immediately sampled for laboratory analysis. All tanker operations from this area have been temporarily curtailed.

Evaluation of Proposed Action: Unknown (Some provision should be made to assure that lids of tankers are secured and checked before transport.)

RFO--EGGR-WSTREPACK-1993-0003 (*Categorized as Emergency*)

Description: A vendor's tanker, reportedly containing 10,000 lb of propane, skidded off the road within the plant's protected area during snow-packed/icy-road conditions and restricted visibility. The tanker, which ended up in a ditch, was stabilized, and 2,700 gal of propane fuel were off-loaded into a second tanker. There was no point of contact for the vendor when he delivered fuel to the site.

Corrective Actions: A single point of contact for vendor deliveries has been established. The vendors must contact this group prior to any fuel delivery and are required to remain in constant radio contact with the single point of contact. Additionally, a decision matrix will be developed and implemented which will determine whether weather, road conditions, or plant conditions allow a favorable delivery.

Evaluation of Proposed Action: Satisfactory

RL--WHC-TRANS&PKG-1994-0002

Description: An onsite shipment of transuranic material requiring public access roads to be closed was conducted. WHC administrative controls were violated because 21 drums were transported in the container, three above the limit approved in the Safety Analysis Report for Packaging (SARP).

Corrective Actions: To be determined when the seriousness of the event is assessed.

Evaluation of Proposed Action: Unknown

RL--WHC-WHC600EM-1993-0016

Description: Five 55-gal drums of oil- and lead-contaminated soils classified and labeled "Hazardous Waste" were removed from an onsite secured-waste-storage location by an unauthorized U. S. Army Corp of Engineers (USACE) contractor and disposed of at the City of Richland sanitary landfill (a nonhazardous waste landfill).

Corrective Actions: The current training plan will be supplemented by adding comprehensive training of hazardous waste identification, handling, and transportation. A more detailed review process will be established to ensure that project teams identify and specifically address hazardous waste requirements for employees and organizational responsibilities. The USACE will establish a Resident Engineer Office in Richland, Washington, for management of contractor field activities and relocate technical managers to the USACE Hanford Program Office, which will contribute to closer project team coordination and daily oversight of field work at Hanford. Attempts will be made to recover the waste or develop a recovery plan.

Evaluation of Proposed Action: Satisfactory

SAN--LLNL-LLNL-1994-0009

Description: After 32 h of flight, an unmanned aerial vehicle suddenly became uncontrollable and crashed within the prescribed test flight area.

Corrective Actions: The site was secured, and the wreckage was collected. An investigation is being conducted which may result in design changes. Further evaluation will determine any necessary corrective actions that are to be taken.

Evaluation of Proposed Action: Satisfactory

A.2. CORRECTIVE ACTION EFFECTIVENESS FOR NOC 2 (PACKAGING)

ALO--WWID-WIPP-1994-0002

Description: Hazardous material (4-L bottle of methanol) was transported offsite in a private vehicle by an unqualified person without the shipment being conducted according to 49 CFR requirements.

Corrective Actions: The involved person was terminated. A briefing of Waste Isolation Pilot Plant (WIPP) employees and a lessons-learned bulletin will be provided on the incident.

Evaluation of Proposed Action: Satisfactory

ALO-AO-MHSM-PANTEX-1994-0112

Description: Improperly labeled samples were transported offsite for week-end storage without being correctly packaged.

Corrective Actions: Job plans for waste characterization sampling will be revised. An alternative, onsite location for short-term staging of waste characterization samples will be established. Procedures will be reviewed that relate to routine sampling of environmental media to ensure compliance with 49 CFR requirements.

Evaluation of Proposed Action: Satisfactory

ID--EGG-TANO-1993-0005

Description: Type A certified packaging was not used for a shipment of sludge which contained a Type A quantity of liquid radioactive material.

Corrective Actions: Actions suggested include (1) request for encompassing procedures for shipments and (2) additional comprehensive training for shippers of hazardous material.

Evaluation of Proposed Action: Satisfactory

ID--EGG-TRA-1994-0001

Description: Several violations of the site Transport Plan were discovered related to a shipment of a radioactive liquid waste tanker loaded with radioactive waste water: (1) the tanker's preventative maintenance semiannual inspection date was extended beyond the due date without authorization; (2) the radiation field at the driver's location in the tractor cab was 55 mrem/h (the

Transport Plan's limit for a "normal" shipment is 26 mrem/h); (3) the Transport Plan was not updated and approved after a modification to the level indicator alarms; and (4) the Fleet Preventive Maintenance Checklist had been modified without an evaluation of the impact to the Transport Plan.

Corrective Actions: The tanker loading procedures were revised to include requirements identified in the approved Transport Plan either as prerequisite or sign-off steps. The tanker was immediately sent for its preventive maintenance inspection. Evaluations are being made of the modifications to the alarm, and the resulting recommendations will be acted upon.

Evaluation of Proposed Action: Satisfactory

ID--EGG-TRAHC-1993-0012

Description: During a DOE review of facility transportation records it was noted that the SARP used for a model 702 cask was outdated. Also, the loading instructions and torque values contained in a new revision of the SARP differed from those used to package the cask in two previous shipments.

Corrective Actions: A detailed review of all cask documentation will be completed, and a new procedure will be made for handling the cask. A complete set of approved documents will be requested from NRC to determine correct cask-handling procedures.

Evaluation of Proposed Action: Conditional (Assurance must be made that the most current version of the SARP is available for all future cask handling operations.)

ID--EGG-TRAHC-1994-0001

Description: A DOE review of the Model "DU" (type 20-WC-2A) overpack container disclosed that the overpack was not intended to be used to package iridium, though it had been used for 11 such domestic shipments during 1993.

Corrective Actions: Remove the containers from use as approved shipping containers for iridium. Complete a review of all supporting documents for licensing and use of radioisotope shipping containers. Establish a controlled document file for the maintenance of cask supporting documentation.

Evaluation of Proposed Action: Satisfactory

ORO--MKFO-Y12CENTENG-1993-0026

Description: A fire is felt to have been caused by a pin-hole leak from an old acetylene gas cylinder.

Corrective Actions: The cylinders will be disposed of properly after evaluation for recording purposes which will assure that the two cylinders are not used again.

Evaluation of Proposed Action: Unknown [M.K. Ferguson (MKFO) is completing the report; inspections need to be performed regularly and documented.]

ORO--MMES-X10REDC-1994-0004

Description: An employee was injured when the drum lid of a solid-low-level-radioactive waste drum was propelled into the air because of overpressurization of the drum contents. Two of eight similar drums were also found to be overpressurized.

Corrective Actions: Instructions will be issued to personnel requiring positive methods of determining that drums are not pressurized prior to repackaging. The current method of disseminating safety information to ensure that it is timely and available will be addressed.

Evaluation of Proposed Action: Conditional (Assurance is needed that recommendations are acted on and appropriate procedures or training is provided.)

ORO--MMES-Y12WASTE-1994-0004

Description: The metal lid of a sealed 55-gal drum which contained calcium hypochlorite was propelled from the drum because of overpressurization. No injuries or damage resulted from this incident.

Corrective Actions: An overpressurization drum consistency team has been formed to recommend actions to prevent recurrence. A yellow alert was issued describing the details of the event.

Evaluation of Proposed Action: Conditional (Assurance is needed that recommendations are acted on and appropriate procedures or training is provided.)

RFO--EGGR-NONPUOPS1-1994-0007

Description: A 1-gal can containing an unknown viscous sample was sent to Bldg. 371 Labs from a Bldg. 444 glove box. The sample was found inside a lead-lined dry-box glove double-bagged in the can.

Corrective Actions: Perform analysis of the sample and dispose of waste in accordance with procedures. Implement future sample requests through the Sample Management Office and Sample Team.

Evaluation of Proposed Action: Satisfactory

RL--WHC-LIQUIDEFL-1994-0003

Description: During preparation for transfer of material from a tank car that was received from the Waste Handling Facility, personnel discovered that valves in the cupola of the tank car were in the open position instead of closed as required by procedure.

Corrective Actions: The procedure for receiving the rail car at the Waste Handling Facility will be modified to include verification of valve position upon receipt. The procedure for shipment of the rail car will be modified to include visual verification that all valves in the rail car cupola are in the closed position prior to shipment. Operations staff will be trained to the new procedures.

Evaluation of Proposed Action: Satisfactory

RL--WHC-TANKFARM-1994-0011

Description: A plutonium source used for calibrations was shipped from an onsite facility to another onsite facility as a Type A material, though it should have been identified and packaged as Type B material (since DOT regulations were required by site procedures to be followed onsite for this type shipment).

Corrective Actions: A procedure will be written to provide guidance to properly characterize hazardous materials for shipment. A comprehensive assessment of WHC procedures which implement DOT requirements is currently being performed as part of a general improvement process.

Evaluation of Proposed Action: Satisfactory

RL--WHC-TANKFARM-1994-0012

Description: During implementation of a waste analysis plan, backlogged waste containers were found to contain solid waste which required additional controls (labelling and packaging) that had not been implemented at the time of packaging.

Corrective Actions: Current procedures provide instructions for generators on how to properly package waste. The waste analysis plan is expected to continue to find previously packaged containers which may have been improperly packaged or labelled.

Evaluation of Proposed Action: Satisfactory

RL--WHC-TPLANT-1994-0002

Description: Two plastic-wrapped, low-level waste items which had been awaiting shipment over a period of time accumulated water due to the weather. Notwithstanding the observed water, they were shipped and disposed of (after ascertaining that no contamination was present) without rewrapping. Procedures are currently in place to prevent such an occurrence.

Corrective Actions: A critique will be held of the occurrence, and a lessons learned report will be generated as required reading.

Evaluation of Proposed Action: Conditional (Reevaluation of current training programs for procedures appears to be needed.)

RL--WHC-WHC1100EM-1993-0028

Description: A damaged package emitted an audible beep because the electronic scale which it contained was activated. Patrol was called to investigate.

Corrective Actions: Personnel will receive refresher training on bomb threats and suspicious package response. No other specific corrective action is required.

Evaluation of Proposed Action: Satisfactory

RL--WHC-WHC200EM-1993-0055

Description: A radioactive source containing ⁹⁰Sr was improperly packaged and shipped without documentation.

Corrective Actions: A desk instruction is being drafted which will enhance existing procedures to instruct personnel on the proper steps to be taken for shipment of sources.

Evaluation of Proposed Action: Satisfactory

SAN--LLNL-LLNL-1994-0040

Description: Two stored, crimp-sealed cans which contained plutonium oxide/ash were found to be bulging.

Corrective Actions: Develop a plan to determine what caused the cans to become pressurized. Procedures are being developed to place all cans in vault storage known to contain similar materials in plastic bags and conduct weekly visual inspections of them. Radiographs of the other 106 cans that contain similar material will be conducted.

Evaluation of Proposed Action: Satisfactory

SR--WSRC-FCAN-1994-0037

Description: Two of the ten clamps of a B-25 waste burial box were found to be rusty and unable to form an effective seal.

Corrective Actions: A procedure is in place to prevent such incidents; however, it will be revised to incorporate inspection criteria. Until then, operators will be briefed on the requirements for inspecting B-25 boxes prior to and after sealing. Training will be conducted on the requirements of the revised procedure.

Evaluation of Proposed Action: Satisfactory

SR--WSRC-RMAT-1994-0014

Description: The new tamper-indicating device seals applied to 6M shipping containers were found to be inadequately sealing and, additionally, causing lacerating injury to personnel.

Corrective Actions: A revision to the pertinent procedure will incorporate a change to the tamper-indicating-device sealing method and require that a pull test be performed on each crimp to ensure that it has sealed. Training on the new procedure will be provided to the personnel.

Evaluation of Proposed Action: Satisfactory

A.3. CORRECTIVE ACTION EFFECTIVENESS FOR NOC 5 (SHIPMENT PREPARATION)

ALO--TSD-TSS-1994-0001

Description: Two special assemblies were shipped offsite between DOE and DoD facilities without an offsite transportation authorization. There were no procedures for use of the Transportation Services Request Form.

Corrective Actions: Instructions on how to fill out the Transportation Services Request Form have been provided; shipment planners have been instructed to insure proper documentation exists prior to arranging shipments.

Evaluation of Proposed Action: Satisfactory

ALO-AO-MHSM-PANTEX-1994-0028

Description: While inspecting a high-explosives intraplant storage/shipping container supposed to be empty, a high-explosives plug was discovered in the container.

Corrective Actions: Procedure will be revised to cover (1) physical inspection of the intraplant container, (2) reissue inspection, and (3) validation requirements for empty container verification; moreover, a new internal procedure will be developed for Material Management Expeditors which covers reacceptance verification prior to reissuance.

Evaluation of Proposed Action: Satisfactory

ALO-AO-MHSM-PANTEX-1994-0090

Description: Review of a DOT communication revealed that the amount of a reagent added to water samples may have been a regulated quantity, which would necessitate that the offsite shipment of the water sample be marked in accordance with DOT hazardous materials regulations.

Corrective Actions: The general operating procedure for addressing movement of regulated materials as samples was revised. Additional training on hazardous materials provided to Environmental Protection personnel. The Environmental Protection Department will request that the Packaging and Shipping Department review and evaluate future non-routine sampling activities of regulated materials.

Evaluation of Proposed Action: Satisfactory

ALO-KO-SNL-7000-1994-0006

Description: A sample shipped to a contract laboratory for testing as hazardous material was discovered to have been radioactively contaminated.

Corrective Actions: The Pollution Prevention Department will enforce the policy for 100% radiation survey of samples received. The hierarchy of procedures required to initiate and perform sampling and radiation surveying of unknown materials will be defined and individual

procedures will be revised as required. Training will be provided and the Office of Environmental, Safety and Health (ES&H) manual will be revised to address sample analysis requests.

Evaluation of Proposed Action: Satisfactory

ALO-LA-LANL-CHEMLASER-1994-0001

Description: A shipment of a 55-gal drum of vacuum pump oil containing radioactive material was in noncompliance with DOT regulations because the transporting vehicle was not placarded and the drum was not properly labelled.

Corrective Actions: Retraining was provided. Property and Transportation personnel will no longer co-sign shipping papers, and packagers or shippers signing the radioactive material transfer form are required to inspect shipments to DOT specifications.

Evaluation of Proposed Action: Satisfactory

ALO-LA-LANL-DPWEST-1993-0001

Description: The Inorganic and Structural Chemistry Group of LANL shipped a wooden box containing hazardous materials which was bound for the United Kingdom to the Materials Management Warehouse. Its shipping papers were not in compliance with DOT regulations, and there were no markings or labels on the box.

Corrective Actions: Since the Packaging and Transportation Division policy is that only trained personnel should package or ship hazardous materials and that only authorized personnel should sign shipping papers; correcting the shipment with appropriate markings and labels was considered to be sufficient.

Evaluation of Proposed Action: Conditional (Having procedures in place and correcting a mistake may not prevent it from occurring again.)

ALO-LA-LANL-ESHSUPT-1994-0001

This report was cancelled by the site because it did not meet the reportability thresholds of DOE Order 5000.3B.

ALO-LA-LANL-MATSCCMPLX-1994-0002

Description: An improperly packaged ⁶⁰Co test source set off the building alarm when a mailman entered the Plutonium Processing and Handling Facility with the package, which read 3.1 mrem/h at contact and 0.3 mrem/h at 1 ft.

Corrective Actions: The packager, a visiting scientist, was made aware of the procedure for mailing hazardous materials. The visitor's host, who is assigned until the visitor is trained and who is serving as escort throughout the visit to ensure compliance with procedures, was also briefed. The visitor's manual will be revised for clarity of the responsibilities of the visitors and hosts.

Evaluation of Proposed Action: Satisfactory

ALO-LA-LANL-MEEFAC-1993-0001

Description: Package personnel discovered a 16-oz glass bottle of a flammable liquid, a dental solvent, which had been transported in a government vehicle over 3 miles on a public access road without proper shipping papers.

Corrective Actions: A training session covering the proper procedure for transportation of hazardous materials will be scheduled for involved personnel.

Evaluation of Proposed Action: Satisfactory

ALO-LA-LANL-PHYSCOMPLX-1994-0002

Description: A properly encapsulated beryllium oxide target was transported on public roadways without all necessary accompanying hazardous material shipping papers. The shipper, a LANL employee, was inexperienced.

Corrective Actions: The LANL supervisor was instructed to (1) remind all drivers to be vigilant in cross-checking shipping papers with package markings and to check each package individually, and (2) ensure that trained personnel are assigned to handle shipments of hazardous materials.

Evaluation of Proposed Action: Satisfactory

ALO-LA-LANL-RADIOCHEM-1994-0003

Description: A shipment of depleted uranium powder (originally ordered from LANL in the form of uranyl nitrate hexahydrate) and natural uranium powder was received from the University of Chicago Enrico Fermi Institute. The material was returned to LANL without being coordinated through the proper administrative channels and, further, NRC Form 741 was not filled out by the university prior to shipment. Processing chemicals, a heavy metal precipitating agent and chloroform, may also be present in the material.

Corrective Actions: The material will be assayed.

Evaluation of Proposed Action: Unknown

ALO-LA-LANL-SIGMA-1994-0003

Description: The Radioactive Materials Transfer Form was filled out incorrectly for a truck shipment sent as a strong tight package (lined with plastic and covered with a tarpaulin) because the form should have indicated six packages instead of one.

Corrective Actions: The shipper was notified that the contents of a tarp-covered vehicle may not necessarily be considered as a single package. The training course content was modified to reflect this assessment.

Evaluation of Proposed Action: Satisfactory

ALO-LA-LANL-TA18-1994-0003

Description: A sealed radioactive source assembly, which weighed 600 lb, was dropped from the bed of its transport truck onto the road during onsite transport. The problem was related to tie-down failure and a faulty lever of the truck door.

Corrective Actions: The latch lever of the truck door was repaired, and the standard operating procedure was revised to reflect a preoperational check of tie-downs and securing mechanism.

Evaluation of Proposed Action: Satisfactory

ALO-LA-LANL-TA55-1994-0004

Description: A discrepancy between the number of packages received in a dumpster-load shipment and the number listed on the shipping manifest was discovered. The problem was related to difficulties in using new software to identify packages.

Corrective Actions: The new software was revised to allow easy entry of duplicate information, and those who ship numerous identical packages were advised to use the non-computerized transfer forms until the revision to the software is made.

Evaluation of Proposed Action: Satisfactory

CH-AA-ANLE-ANLEERD-1994-0001

Description: An unlabeled fiber drum containing 1-liter and 4-liter glass beakers (in which waste radioactive liquid had been accumulated and dried) was inadvertently placed in the normal trash stream. The upper limit of the estimated radioactivity for the nuclides was 0.2 μ Ci.

Corrective Actions: Refresher training regarding control of radioactive material will be provided to the scientist and analyst involved in the incident.

Evaluation of Proposed Action: Satisfactory

CH-AA-ANLE-ANLEERD-1994-0002

Description: A data logger (for measurement of water levels in wells) containing a commercial, sealed, lithium battery pack was returned to the vendor by commercial aircraft. The package was not appropriately classified and marked.

Corrective Actions: Information concerning lithium batteries will be presented to all ES&H Coordinators and Safety Coordinators at an upcoming meeting.

Evaluation of Proposed Action: Unknown (The information needs dissemination at working level or to be incorporated into a procedure.)

CH-AA-ANLE-ANLEEWM-1994-0003

Description: One drum of a 56-drum shipment of mixed waste was incorrectly marked as a limited quantity of radioactive material.

Corrective Actions: A guidance document was developed for work that generates mixed waste, containing information on labeling and preshipment preparation for radioactive waste shipments to WHC. A new checklist will be expanded to include a section for verifying the correct labeling and marking of each individual container, and appropriate procedures will be revised.

Evaluation of Proposed Action: Satisfactory

CH-AA-ANLE-ANLEEWM-1994-0004

Description: Westinghouse Hanford Company held up releasing a waste shipment which was received from Argonne due to the package having radiation readings above 0.5 mR/h on contact. The waste material was shipped as nonregulated material, but should have been shipped as radioactive due to the radiation level as measured.

Corrective Actions: The material was reclassified as Radioactive-Low Specific Activity. The ANLE transportation procedures were updated to specify that material classified as nonregulated must be approved by a departmental manager.

Evaluation of Proposed Action: Satisfactory

CH-BH-BNL-BNL-1993-0029

Description: One drum of a waste oil shipment was found to contain polychlorinated biphenyls, though the manifest did not indicate their presence.

Corrective Actions: Annual Hazardous Waste Generator Refresher Training is currently being piloted/conducted.

Evaluation of Proposed Action: Unknown (Preparation and final compliance signatures on the manifest should be responsibility of skilled Transportation Department personnel or waste personnel who are thoroughly trained in DOT requirements.)

NVOO--REEC-EMD3-1993-0001

Description: The manifests of two shipments from a subcontractor incorrectly designated "Fissile Exempt" material as "Fissile."

Corrective Actions: A hold point to manually verify all isotopic calculations and bill of lading designations prior to shipment was established. (Past shipments are being reviewed to determine if similar mistakes were made.) The computer program that generates shipping documents to ensure correct Bill of Ladings are generated are to be verified and validated.

Evaluation of Proposed Action: Satisfactory

ORO--FERM-FEMP-1993-0056

Description: A shipment of scrap material transported for recycling had an incorrect material description that did not indicate the presence of lead.

Corrective Actions: A comprehensive project-specific checklist will be used for all activities in the future. The language of subcontracts and work plans will incorporate descriptions of responsibility similar to chain-of-custody forms.

Evaluation of Proposed Action: Satisfactory

ORO--FERM-FEMP-1994-0054

Description: An overloaded tractor trailer being relocated had its load to shift forward, and a pin on the right shoe of the landing gear snapped, almost causing the trailer to tip over.

Corrective Actions: The trailer will be stabilized and unloaded. A required reading summarizing the incident will be sent to appropriate supervisors.

Evaluation of Proposed Action: Conditional (Prevention of future overloading incidents has not been fully addressed.)

ORO--MMES-K25GENLAN-1993-0037

Description: A DOT audit of the three Oak Ridge sites uncovered nine violations of DOT regulations involving shipping papers, record keeping, and Federal Motor Carrier Safety Regulations (FMCSR) issues. A \$135,000 fine has been initially imposed by DOT.

Corrective Actions: A compliance plan was written which will ensure compliance with the FMCSR and hazardous material regulations. Assessments will be conducted of the compliance actions to assure effectiveness of implementation.

Evaluation of Proposed Action: Satisfactory

ORO--MMES-Y12DEFFPGM-1993-0096

Description: A potential shipper/receiver difference was identified on a shipment of weapon trainer units. Upon disassembling one of the trainers, the total of uranium collected exceeded the quantity anticipated by several kilograms.

Corrective Actions: It was concluded that Y-12 does possess what was physically shipped and does have the most nearly accurate data about the contents of the units. A request will be made that Y-12 be approved to use its recovered value on future shipments.

Evaluation of Proposed Action: Satisfactory

ORO--MMES-Y12SITE-1994-0015

Description: While being transferred onto a flat-bed trailer, a 1,979-kg depleted uranium billet fell from a skid to the pavement, probably due to the breaking of the strap securing the billet to the pallet. Fewer than 15 g of uranium oxide dust was spread because of the fall.

Corrective Actions: Health and safety procedures were revised to reflect DOT requirements for securing cargo loads. A written job hazards analysis will be required before hoisting and rigging work is performed. The use of 0.5-in. bands to secure billets will be stopped, and 1.25-in. bands will be used.

Evaluation of Proposed Action: Satisfactory

ORO--MMES-Y12WASTE-1994-0005

Description: A flatbed trailer carrying 13 bales of compacted sanitary waste partially overturned when the load shifted inside the DOE Oak Ridge Reservation boundary.

Corrective Actions: The bales were loaded onto another trailer. An independent investigative team was established by Waste Management/Decontamination and Decommissioning to identify cause(s) and make corrective action(s) recommendation. Interim measures imposed will result in no more than seven bales being transported at one time in order to eliminate double stacking the bales.

Evaluation of Proposed Action: Unknown (Completion of task analysis and training for transporting plastic-clad waste bales is needed.)

RFO--EGGR-SOLIDWST-1994-0065

Description: Five waste drums, which did not have the required radioactive material labels, were transferred to another building to be assayed.

Corrective Actions: The person required to affix the label was counseled. Existing procedures cover this requirement.

Evaluation of Proposed Action: Satisfactory

RFO--EGGR-UTILITIES-1994-0007

Description: While being transported, a platform ladder/stairwell loaded onto a flatbed trailer struck an overhead signal cable mounted below electrical power lines. In addition to poor route planning for movement of the ladder, the signal line was found to be 4.5 in. lower than the minimum requirements of the National Electrical Safety Code.

Corrective Actions: Not specified

Evaluation of Proposed Action: Unknown

RL--WHC-ANALLAB-1993-0023

Description: A regulated hazardous waste (1.5% silver) was mistakenly shipped in a drum containing low-level radioactive waste.

Corrective Actions: Waste packaging personnel, in addition to the trained employee who shipped the drum, were cautioned to ensure that waste identification numbers are cross referenced with the identification number on the disposal request sheet.

Evaluation of Proposed Action: Satisfactory

RL--WHC-SOLIDWASTE-1993-0034

Description: Solid Waste Management personnel prepared, shipped, and received offsite waste shipments without the required training and certification of HM-126-F (49 CFR 172.700).

Corrective Actions: The personnel required to have the training have been scheduled for it. A minimum at one qualified person will be in attendance at all incoming and outgoing offsite shipments.

Evaluation of Proposed Action: Satisfactory

RL--WHC-SOLIDWASTE-1993-0044

Description: A Type A shipment of tritium waste was shipped using a Storage/Disposal Approval Record (SDAR), which was outdated. The waste was received and accepted for storage even though it had a voided SDAR.

Corrective Actions: The generator and receiver (both trained personnel) of the waste were notified of the discrepancy. The error was corrected, and the waste is awaiting approval of a waste plan for disposal.

Evaluation of Proposed Action: Satisfactory

RL--WHC-SOLIDWASTE-1994-0022

Description: A 55-gal steel drum placed on the bed of a truck for the purpose of collecting dirt and rocks shifted on the truck bed and broke the rear window of the truck's cab, thus causing minor employee injury. Procedures did not require the load to be tied down while moving between Solid Waste Management (SWM) facilities.

Corrective Actions: Procedures relative to the transportation of loads within SWM facilities will be revised to state the loads must be tied down.

Evaluation of Proposed Action: Conditional (Training needs to be provided for new procedures.)

SAN--SU-SLAC-1994-0003

Description: A mixed waste shipment was made with an improper manifest.

Corrective Actions: Develop a procedure to (1) describe manifest and shipping paperwork preparation, and (2) clearly define the shipping paper review process.

Evaluation of Proposed Action: Conditional (Training needs to be provided for new procedures.)

SR--WSRC-FSD-1994-0002

Description: A hazardous material sample was shipped offsite as a nonhazardous shipment; the shipping container was correctly marked, but the shipping documents were incorrect.

Corrective Actions: Additional training was provided, emphasizing review of the packaging plan while preparing shipping orders; more detail is to be added to the Sample Packaging Plan Checklist.

Evaluation of Proposed Action: Satisfactory

SR--WSRC-WVIT-1993-0057

Description: A heel of 301 gal of synthetic sludge was left in the bottom of a tanker after it was flushed. It was later discovered that the constituents of the sludge were hazardous, though the vendor had determined the constituents not to be so and disagreed with the reclassification.

Corrective Actions: All materials received will have the Material Safety Data Sheets reviewed for proper shipping classification. Related procedures will be revised to include requirements for visual inspection after unloading and flushing. All containers leaving the area will have shipping papers initiated by the Chemical Coordinator or the Hazardous Material Technical Representative.

Evaluation of Proposed Action: Conditional (Materials should not be received from the vendor until determination is made of whether the vendor is classifying materials in accord with DOT requirements.)

SR--WSRC-WVIT-1994-0045

Description: A tanker containing a DOT-allowed hazardous material residue was shipped to the vendor without being placarded.

Corrective Actions: Additional training and guidance are being offered to personnel involved in such shipments. An interim standing order has been implemented, until a procedure can be developed, to prevent inadvertent shipping without proper paperwork.

Evaluation of Proposed Action: Satisfactory.

A.4. SAMPLING OF UPDATED ORs

ALO-LA-LANL-HEMACHPRES-1994-0002

Description: A radiological control technician discovered two small spots of beta-gamma contamination (measuring 62,000 and 2,000 dpm/100 cm²) in the bed of a government truck that was located in an uncontrolled area. The contamination was discovered when the truck, which was planned to be auctioned off to the public, was being surveyed for contamination according to procedures.

Corrective Actions: Turned over to another investigator for resolution

Evaluation of Proposed Action: Unknown

ALO-LA-LANL-SIGMA-1994-0007

Description: While conducting a survey of a government vehicle in accordance with requirements for dispositioning vehicles to be sold to the public, a probe of the vehicle detected a spot of removable, beta/gamma contamination (6,000 dpm/probe area) inside the cab of the pickup.

Corrective Actions: Turned over to another investigator for resolution

Evaluation of Proposed Action: Unknown

ORO-MMES-PORTCASOPS-1994-0005

Description: Health Physics technicians discovered contaminated articles loaded among trash on a pickup truck in a nonradiological area. Further investigation revealed that a second truckload of waste had been transported to a landfill and buried.

Corrective Actions: The contaminated debris was recovered from the landfill, and, afterwards, the affected area was surveyed for contamination before being returned to normal operations.

Evaluation of Proposed Action: Unknown (The actions do not provide prevention measures for future instances.)

ORO--FERM-FEMP-1994-0051

Description: A shipment arrived at FEMP from IT Corporation which was marked as radioactive material, low specific activity. The shipment was not properly placarded; nor was the load blocked and braced.

Corrective Actions: The contract officer for IT Corporation was notified. Traffic was directed to contact the IT Radiation Safety Officer responsible for approving the shipment and inform him of the violation. The investigation is ongoing.

Evaluation of Proposed Action: Unknown (IT is responsible for the prevention of recurrence.)

RL--WHC-LIQUIDEFL-1994-0009

Description: Three burial boxes and 55 drums of Category 3 low-level radioactive waste were erroneously shipped to low-level burial grounds as Category 1 waste, resulting in its burial in a Category 1 LLW trench. (Category 3 waste has a higher isotopic activity than Category 1 designated waste.)

Corrective Actions: The automated LLW category assignment function currently being developed for the Solid Waste Information Tracking System will be utilized. An internal system will be instituted to facilitate peer review of LLW categorization calculations prior to physical dispositioning of waste. Reposition the waste if the burial trenches are not reclassified.

Evaluation of Proposed Action: Satisfactory

SAN--LLNL-LLNL-1994-0022

Description: Prior to removal from a non-DOE carrier, a container of 50% hydrogen peroxide solution was discovered to be leaking. Furthermore, the placarding and labeling of the shipment were erroneous.

Corrective Actions: The driver of the truck was cited by the California Highway Patrol for several DOT violations and the vendor was notified. A tracking list based on this reporting criteria will be created and maintained by the Business Operations Assurance Office to identify repeated vendor errors. Appropriate action may include preparation of a "nonconformance and failure report" or use of other methods such as vendor meetings or surveys.

Evaluation of Proposed Action: Satisfactory

SAN--LLNL-LLNL-1994-0036

Description: While receiving incoming material from a vendor, a LLNL Material Handler reported that a package containing silver nitrate was not labeled as an oxidizer.

Corrective Actions: The vendor was notified, and a nonconformance report was prepared. The event was added to Business Operations tracking list of "like" vendor error occurrence reports.

Evaluation of Proposed Action: Satisfactory

SAN--LLNL-LLNL-1994-0053

Description: Waste soil generated during the closure of an underground diesel fuel storage tank was sent offsite for disposal at a Class III landfill. The concentrations of petroleum hydrocarbons potentially exceeded the disposal site's waste acceptance criteria.

Corrective Actions: The soil disposition review process for all waste soils from tank closures has been temporarily halted to allow for a thorough review of procedures. A formal soil management and disposition procedure is being developed. Additionally, a new tracking system and database is being developed to manage and track the soil and rubble from preconstruction sampling through landfill disposal.

Evaluation of Proposed Action: Satisfactory

Appendix B:

**SELECTED TRANSPORTATION- AND PACKAGING-RELATED
OCCURRENCE REPORTS FOR FY 1994**

Table B.1. ORs included in annual report for FY 1994

Report No.	Status	Category	NOC	REP_QT
ALO--ROSS-TSS-1994-0001	F	O	6B	R9414
ALO--ROSS-TSS-1994-0002	F	O	6B	R9432
ALO--TSD-TSS-1994-0001	F	O	5A	R9409
ALO--UMTR-UMTRA-1993-0032	F	O	1A1	R9340
ALO--UMTR-UMTRA-1993-0033	F	O	6A	R9340
ALO--UMTR-UMTRA-1993-0034	F	O	6A	R9341
ALO--UMTR-UMTRA-1993-0036	F	O	1A1	R9341
ALO--UMTR-UMTRA-1993-0039	F	O	1A1	R9343
ALO--UMTR-UMTRA-1993-0042	F	O	1A1	R9345
ALO--UMTR-UMTRA-1993-0043	F	O	1A1	R9344
ALO--UMTR-UMTRA-1993-0044	F	O	1A1	R9345
ALO--UMTR-UMTRA-1994-0002	F	O	1B2	R9413
ALO--UMTR-UMTRA-1994-0003	F	O	1A2	R9417
ALO--WWID-WIPP-1994-0002	F	O	2B	R9408
ALO--WWID-WIPP-1994-0005	F	O	4	R9428
ALO-AO-MHSM-PANTEX-1993-0058	F	O	6A	R9345
ALO-AO-MHSM-PANTEX-1994-0028	F	O	5C	R9412
ALO-AO-MHSM-PANTEX-1994-0038	F	O	1A3	R9414
ALO-AO-MHSM-PANTEX-1994-0090	F	O	5	R9428
ALO-AO-MHSM-PANTEX-1994-0107	F	O	8A	R9430
ALO-AO-MHSM-PANTEX-1994-0112	T	O	2B	R9431
ALO-DA-EGGM-EGGMAT04-1994-0002	F	O	8D	R9409
ALO-KO-SNL-2000TTR-1994-0001	F	O	6A	R9406
ALO-KO-SNL-7000-1994-0002	F	O	6A	R9410
ALO-KO-SNL-7000-1994-0004	F	O	6A	R9416
ALO-KO-SNL-7000-1994-0006	F	O	5	R9426
ALO-KO-SNL-NMSEC-1994-0002	F	O	6A	R9407
ALO-LA-GOLA-FIREDEPT-1994-0003	F	O	6A	R9424
ALO-LA-LANL-ACCCOMPLEX-1994-0002	F	O	1B2	R9413
ALO-LA-LANL-CHEMLASER-1994-0001	F	O	5C	R9413
ALO-LA-LANL-DPWEST-1993-0001	F	O	5	R9340
ALO-LA-LANL-ESHSUPT-1994-0001	F	C	5	R9404
ALO-LA-LANL-FIRNGHELAB-1994-0001	F	O	6A	R9404

Table B.1. (continued)

Report No.	Status	Category	NOC	REP_QT
ALO-LA-LANL-HEMACHPRES-1994-0002	U	O	1A3	R9428
ALO-LA-LANL-LANL-1994-0005	U	U	5C	R9422
ALO-LA-LANL-MATSCCMPLX-1994-0002	F	O	5	R9409
ALO-LA-LANL-MATWAREHS-1993-0027	F	O	8A	R9340
ALO-LA-LANL-MATWAREHS-1993-0028	F	O	8A	R9346
ALO-LA-LANL-MATWAREHS-1993-0031	F	O	8A	R9402
ALO-LA-LANL-MEEFAC-1993-0001	F	O	5	R9340
ALO-LA-LANL-PHYSCOMPLX-1994-0002	F	O	5A	R9407
ALO-LA-LANL-PHYSCOMPLX-1994-0004	T	O	8	R9421
ALO-LA-LANL-PHYSTECH-1994-0003	F	O	6A	R9405
ALO-LA-LANL-RADIOCHEM-1994-0003	U	O	5	R9418
ALO-LA-LANL-SERVICISS-1994-0011	F	O	8D	R9421
ALO-LA-LANL-SIGMA-1994-0003	F	O	5A	R9405
ALO-LA-LANL-SIGMA-1994-0007	U	O	1A3	R9431
ALO-LA-LANL-TA18-1994-0003	F	O	5D	R9424
ALO-LA-LANL-TA55-1994-0004	F	O	5A	R9406
ALO-PI-MMSC-PINELLAS-1994-0004	F	O	4	R9408
ALO-PI-MMSC-PINELLAS-1994-0017	F	O	6A	R9433
CH--AMES-AMES-1994-0002	F	U	5A	R9412
CH-AA-ANLE-ANLEER-1993-0011	F	O	8A	R9345
CH-AA-ANLE-ANLEERD-1994-0001	F	O	5	R9423
CH-AA-ANLE-ANLEERD-1994-0002	F	O	5C	R9423
CH-AA-ANLE-ANLEEW-1994-0003	F	O	5B	R9416
CH-AA-ANLE-ANLEEW-1994-0004	F	O	5	R9435
CH-BH-BNL-BNL-1993-0029	F	O	5A	R9347
CH-BH-BNL-BNL-1994-0019	T	O	4	R9437
CH-BH-BNL-PE-1994-0002	T	O	1A3	R9407
CH-BH-BNL-PE-1994-0003	F	O	1B1	R9408
HQ--BPOI-NPRC-1994-0007	F	U	1B1	R9408
HQ--BPOI-NPRC-1994-0033	F	O	1B1	R9429
HQ--BPOI-NPRC-1994-0039	T	O	6	R9438
HQ--GOME-METC-1994-0012	T	U	8F	R9437
HQ--SALV-LVOGD-1993-0005	F	O	8D	R9352
HQ--SPR-BH-1994-0005	F	O	8F	R9434
HQ--SPR-BM-1993-0011	F	O	6	R9350

Table B.1. (continued)

Report No.	Status	Category	NOC	REP_QT
HQ--SPR-SJ-1994-0006	F	O	6A	R9433
HQ--URA-SSCL-1994-0001	F	O	6	R9430
HQ--URA-SSCL-1994-0003	F	O	6A	R9436
ID--EGG-ERATOWNFAC-1994-0004	T	U	8D	R9420
ID--EGG-TANO-1993-0005	F	O	2B	R9351
ID--EGG-TRA-1994-0001	F	O	2C	R9403
ID--EGG-TRA-1994-0019	F	O	6A	R9438
ID--EGG-TRAHC-1993-0012	F	O	2C	R9401
ID--EGG-TRAHC-1994-0001	F	O	2C	R9409
ID--WINC-FUELRCTR-1994-0008	F	U	2C	R9429
ID--WVNS-EOT-1993-0008	F	O	8A	R9345
ID--WVNS-EOT-1993-0009	F	O	8A	R9405
NVOO--EGGO-LAOO-1993-0001	F	O	8B	R9346
NVOO--EGGO-RSLO-1993-0004	F	O	6B	R9345
NVOO--REEC-ADMN1-1994-0001	T	O	6	R9431
NVOO--REEC-EMD3-1993-0001	F	O	5A	R9340
NVOO--REEC-EMD3-1993-0002	F	O	6A	R9352
ORO--FERM-FEMP-1993-0056	F	O	5A	R9340
ORO--FERM-FEMP-1993-0066	F	O	8A	R9349
ORO--FERM-FEMP-1994-0005	F	O	8	R9405
ORO--FERM-FEMP-1994-0009	F	O	8A	R9407
ORO--FERM-FEMP-1994-0016	F	O	8A	R9415
ORO--FERM-FEMP-1994-0041	F	O	8A	R9428
ORO--FERM-FEMP-1994-0047	F	O	8A	R9430
ORO--FERM-FEMP-1994-0051	U	O	8A	R9439
ORO--FERM-FEMP-1994-0053	U	O	5	R9434
ORO--FERM-FEMP-1994-0054	F	O	5D	R9433
ORO--FERM-FEMP-1994-0066	F	O	8A	R9439
ORO--MKFO-K25CONSTRM-1994-0002	T	O	1A3	R9436
ORO--MKFO-X10CONSTRM-1994-0008	F	O	1A1	R9425
ORO--MKFO-Y12CENTENG-1993-0021	T	O	1A3	R9406
ORO--MKFO-Y12CENTENG-1993-0026	T	O	2A	R9402
ORO--MKFO-Y12CONSTRM-1994-0010	F	O	1A3	R9430
ORO--MMES-ENVRES-1994-0005	T	O	1A1	R9427
ORO--MMES-K25GENLAN-1993-0033	F	O	6A	R9343

Table B.1. (continued)

Report No.	Status	Category	NOC	REP_QT
ORO--MMES-K25GENLAN-1993-0037	F	O	5A	R9348
ORO--MMES-PGDPENVRES-1994-0003	F	O	6A	R9413
ORO--MMES-PORTCASOPS-1994-0005	U	O	1A1	R9423
ORO--MMES-PORTENVRES-1993-0006	T	O	1B1	R9340
ORO--MMES-X10BOPLANT-1994-0006	T	O	4	R9429
ORO--MMES-X10CHEMTEC-1994-0006	F	O	8D	R9414
ORO--MMES-X10FINMAT-1993-0002	F	O	8A	R9340
ORO--MMES-X10PLEQUIP-1994-0004	F	O	6A	R9432
ORO--MMES-X10REDC-1994-0004	F	O	2B	R9425
ORO--MMES-X10REDC-1994-0005	F	O	1A2	R9428
ORO--MMES-Y12DEFPGM-1993-0092	F	O	8A	R9348
ORO--MMES-Y12DEFPGM-1993-0096	T	O	5	R9350
ORO--MMES-Y12DEFPGM-1994-0002	T	O	1A3	R9403
ORO--MMES-Y12DEFPGM-1994-0007	F	O	8A	R9412
ORO--MMES-Y12SITE-1993-0012	F	O	1A3	R9429
ORO--MMES-Y12SITE-1994-0015	T	O	5D	R9417
ORO--MMES-Y12WASTE-1994-0004	T	O	2C	R9423
ORO--MMES-Y12WASTE-1994-0005	T	O	5D	R9425
RFO--EGGR-371OPS-1994-0088	F	O	8B	R9435
RFO--EGGR-NONPUOPS1-1994-0007	F	O	2B	R9415
RFO--EGGR-SOLIDWST-1994-0065	T	O	5C	R9430
RFO--EGGR-SUPPORT-1993-0028	F	O	6A	R9351
RFO--EGGR-SUPPORT-1994-0011	T	O	8B	R9420
RFO--EGGR-SUPPORT-1994-0018	U	U	6A	R9426
RFO--EGGR-UTILITIES-1994-0007	U	O	5D	R9431
RFO--EGGR-WSTREPACK-1993-0003	F	E	8D	R9348
RFO--EGGR-WSTREPACK-1994-0001	T	U	1B1	R9415
RL--KEH-KEH-1993-0027	F	O	1B1	R9340
RL--PNL-PNLBOPER-1993-0034	F	O	1A3	R9340
RL--PNL-PNLBOPER-1993-0041	F	O	8	R9352
RL--PNL-PNLBOPER-1994-0046	T	O	8A	R9438
RL--WHC-ANALLAB-1993-0023	T	O	5	R9348
RL--WHC-BPLANT-1994-0031	F	O	1A3	R9438
RL--WHC-ERO-1994-0002	T	O	1B1	R9418
RL--WHC-KBASINS-1994-0020	T	O	1A3	R9425

Table B.1. (continued)

Report No.	Status	Category	NOC	REP_QT
RL--WHC-KHCONST-1994-0012	F	O	1A3	R9429
RL--WHC-KHCONST-1994-0020	F	O	6A	R9439
RL--WHC-KHFLEETOP-1994-0007	T	O	6C	R9426
RL--WHC-LIQUIDEFL-1994-0003	T	O	2C	R9415
RL--WHC-LIQUIDEFL-1994-0009	U	O	4	R9432
RL--WHC-PROCMATMGT-1994-0008	T	O	8F	R9423
RL--WHC-SOLIDWASTE-1993-0034	F	O	5A	R9343
RL--WHC-SOLIDWASTE-1993-0044	T	O	5A	R9352
RL--WHC-SOLIDWASTE-1994-0020	T	O	1A3	R9435
RL--WHC-SOLIDWASTE-1994-0022	T	O	5D	R9439
RL--WHC-TANKFARM-1994-0011	T	O	2B	R9411
RL--WHC-TANKFARM-1994-0012	U	O	2	R9428
RL--WHC-TPLANT-1994-0002	F	O	2A	R9406
RL--WHC-TPLANT-1994-0024	F	O	1A3	R9436
RL--WHC-TRANS&PKG-1994-0002	T	U	2C	R9414
RL--WHC-WHC1100EM-1993-0028	T	O	2A	R9340
RL--WHC-WHC1100EM-1993-0032	T	O	8D	R9344
RL--WHC-WHC1100EM-1993-0035	T	O	8B	R9347
RL--WHC-WHC1100EM-1993-0037	T	O	8A	R9349
RL--WHC-WHC1100EM-1993-0038	T	O	8	R9351
RL--WHC-WHC200EM-1993-0055	T	O	2B	R9344
RL--WHC-WHC600EM-1993-0016	U	U	8F	R9351
SAN--LBL-EHS-1994-0001	F	O	8A	R9420
SAN--LLNL-LLNL-1994-0008	F	O	4	R9407
SAN--LLNL-LLNL-1994-0009	U	U	6B	R9407
SAN--LLNL-LLNL-1994-0022	U	O	8A	R9413
SAN--LLNL-LLNL-1994-0028	F	O	8A	R9418
SAN--LLNL-LLNL-1994-0034	T	O	8A	R9424
SAN--LLNL-LLNL-1994-0036	U	O	8A	R9425
SAN--LLNL-LLNL-1994-0038	T	O	8A	R9426
SAN--LLNL-LLNL-1994-0040	U	O	2B	R9432
SAN--LLNL-LLNL-1994-0053	U	O	4	R9432
SAN--SU-SLAC-1994-0003	F	O	5A	R9412
SR--WSRC-CMD-1993-0011	F	O	6A	R9349
SR--WSRC-CMD-1993-0014	F	O	8	R9350

Table B.1. (continued)

Report No.	Status	Category	NOC	REP_QT
SR--WSRC-CMD-1994-0002	F	O	6A	R9415
SR--WSRC-ESH-1994-0001	F	O	8D	R9403
SR--WSRC-FBLINE-1994-0042	T	O	1A3	R9438
SR--WSRC-FCAN-1994-0037	F	O	2	R9423
SR--WSRC-FCAN-1994-0038	F	C	1A3	R9422
SR--WSRC-FSD-1994-0002	F	O	5A	R9424
SR--WSRC-REACP-1993-0018	F	O	1A1	R9345
SR--WSRC-RMAT-1994-0006	F	O	1A3	R9413
SR--WSRC-RMAT-1994-0014	F	O	2C	R9427
SR--WSRC-SLDHSD-1994-0024	T	O	8D	R9434
SR--WSRC-TD-1994-0001	F	O	8F	R9411
SR--WSRC-WVIT-1993-0057	F	O	5	R9345
SR--WSRC-WVIT-1994-0045	F	O	5A	R9424

Notes:

1. Status: The report's notification status: notification (N), final (F), ten-day (T), or ten-day update (U).
2. Category: DOE Order 5000.3B categories: emergency (E), unusual (U), or off-normal (O). "C" signifies cancelled.
3. NOC: PATS Nature of Occurrence.
4. REP_QT: The Weekly Report in which the OR was reported to DOE-HQ (i.e., R9350 means Weekly Report number 50 of 1993).